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ABSTRACT

This curriculum guide seeks to contribute vision to the values and goals of outdoor education and to show their relevance to all curricular areas. Direction is provided for developing and implementing a dynamic curriculum in outdoor education. The guide is divided into three sections. Section I addresses the informational needs of administrators and curriculum specialists. It includes a definition of, and outcomes for, outdoor education; a description of a resident outdoor school; a review of relevant research and learning theory; and consideration of ways to maximize the impact of the outdoor school. Section II outlines the California State Department of Education components as they apply to the resident outdoor school curriculum. It also includes 11 pre and post outdoor school lesson plans and other curricular ideas for the classroom teacher. Section III articulates to teachers and administrators effective avenues to involve parents in supporting and facilitating the outdoor education program. Guidelines are presented, along with suggested learning activities. Contains 92 references organized by section and chapter. An appendix contains California education codes related to outdoor education. (LZ)

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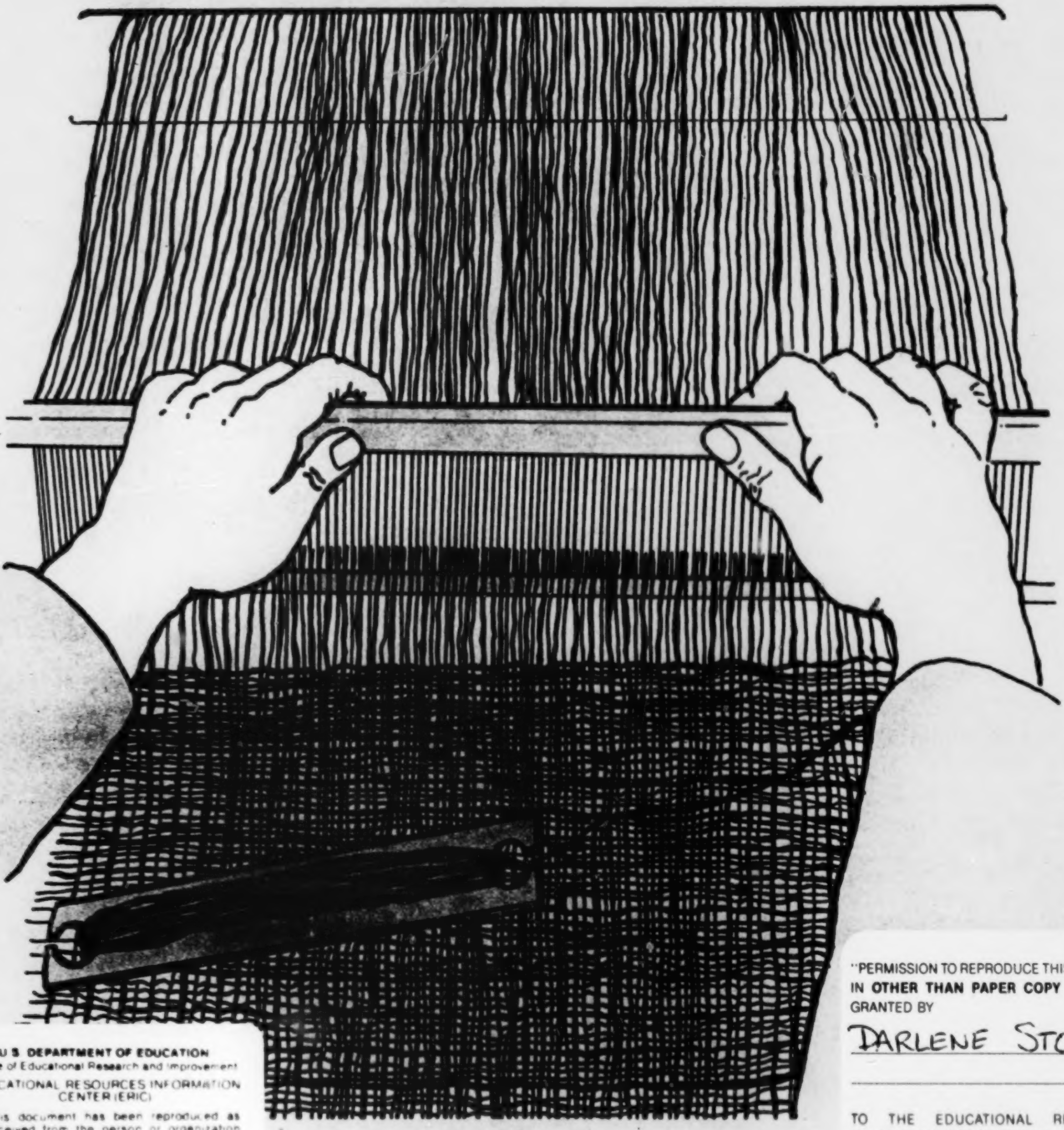
CALIFORNIA OUTDOOR SCHOOL CURRICULUM GUIDE



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CALIFORNIA OUTDOOR SCHOOL CURRICULUM GUIDE

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This guide is dedicated to Rudolph J. H. Schafer under whose leadership environmental education has become an important component in the education of the children in the state of California.

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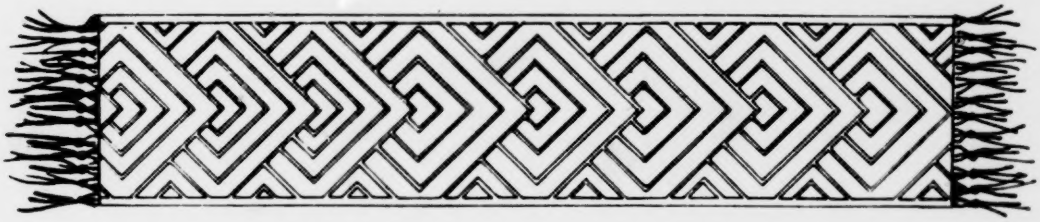
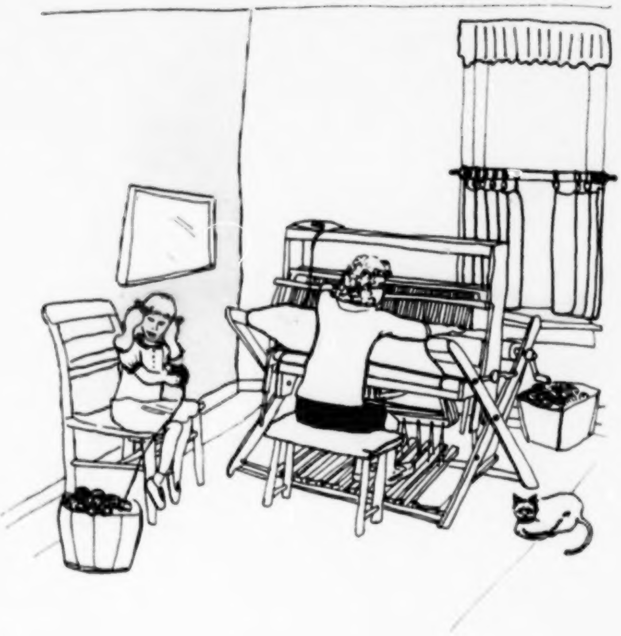


PREFACE



The lives of all of us are inextricably interwoven into the tapestry of life that covers planet Earth. The environment is an extension of ourselves and we cannot live apart from it. As we respect and care for ourselves, so should we respect and care for our environment which sustains all life. This relationship was as true for our ancestors as it is for us today and will always be so. Yet, how many of our youth have an understanding of the basic principles of ecology which delineate our relationship to a finite ecosystem? How many grasp the relationship of natural resources to the needs of people? How many could say that through their actions they are the positive and productive weavers of our environmental future?

Tomorrow must begin in the hearts and minds of our children today. While apprenticing as weavers of the future, children obtain environmental awareness, skills, knowledge, and concern. These fundamental components of a personal environmental ethic are best developed within a planned scope and sequence which permeates the instructional program at all grade levels. It is essential, however, that a structured and extended experience with the natural world be provided. The resident outdoor school, with a four to five day program in which students and their teachers experience the natural world on an emotional, aesthetic, intellectual, and ethical basis, is this essential element in the process of developing an informed environmental conscience.

The heart must listen before the mind can comprehend. The resident outdoor school is the pathway for sensory experiences which evoke feelings of enjoyment, exhilaration, and awe about the out-of-doors. Within this aesthetic realm, utilizing the process skills of observing and investigating, students discover the complexity of their environment. The ecosystem of the outdoor school provides an opportunity for students to explore a relationship with natural systems by using all subject areas to encourage the cooperative connection of responsible human activity with environmental quality.

The resident outdoor school provides another learning experience uniquely important to our weavers of the future. The students live and work together with others from varying backgrounds. Thus, the outdoor school becomes a microcosm of society in which students learn that a viable, productive, and aesthetically satisfying environment requires commitment and responsible action by all members of society.

What will the weaving process and product consist of for students participating in an outdoor school?

- The initial strands, to be completed before going to outdoor school, include learning basic ecological concepts and becoming familiar with the outdoor school program.
- During the outdoor school experience, the natural resources including plants, animals, air, soil, and water, are woven into a socio-ethical tapestry. Colorful threads representing subject matter areas of science, social science, mathematics, language arts, health, physical education, art, and music are woven together to enhance an understanding of natural resources on an emotional, as well as intellectual, basis.
- Finally, outdoor learnings are reinforced and strengthened by the fiber of home and school activities.

The resulting tapestry has cultural threads with strength to last a lifetime and can be passed on to future generations. Student outcomes are positive attitudes, knowledge, and behaviors related to a stewardship responsibility for the environment. The outdoor school has more potential to affect a child's attitude and actions toward the environment than any other educational experience.

Educators are responsible for training the weavers of tomorrow's tapestry of life. We already have some holes in today's fabric -- acid rain, loss of wildlife habitat, and toxic waste problems, to name a few. Can today's students identify these and similar defects now and in the future? Will they possess the skills and commitment to rectify them?

The outdoor school program provides unique learning opportunities which enable students to honor the gifts of their heritage by becoming responsible weavers of tomorrow's ecological world. For this program to happen, a variety of people -- including classroom teachers, administrators, parents, school board members, the business and professional community, citizen volunteers, and legislators -- must become a part of the educational process. No matter who you are, if you believe in the importance of education for every student's future, we challenge you to become involved in this essential program! In the pages that follow, basic weaving directions are provided. These include justifications for and background on outdoor school; pre- and post-activities for the classroom teacher to implement; an insight into the outdoor school experience; and suggestions for implementing an outdoor education program.

This document seeks to contribute vision to the values and goals of outdoor education and to show their relevance to all curricular areas. Direction is provided for developing and implementing a dynamic curriculum in outdoor education. Even the best, most carefully written guidebook, however, is useless unless a commitment to effective action is made. The stakes are high. We are talking about our children's future and that of future generations. We cannot, must not, fail them.

"SONG OF THE SKY LOOM"

Oh our Mother the Earth,
Oh our Father the Sky...
Weave for us a garment
of brightness;

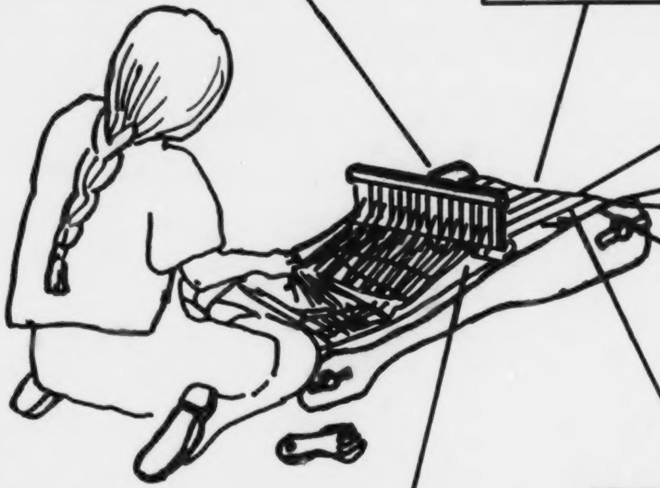
May the warp be the
white light of morning,
May the weft be the
red light of evening,
May the fringes be
the falling rain,
May the border be
the standing rainbow...

That we may walk fittingly where
birds sing...
where grass is green,

On our Mother the Earth,
oh our Father the Sky!

Herbert Spinden

THE MAKING OF THE OUTDOOR EDUCATION TAPESTRY



The goal of OUTDOOR EDUCATION is to increase awareness, knowledge, and attitudes, and to develop critical thinking skills and actions, related to the physical and biotic environment.

ENGLISH-LANGUAGE ARTS
- environmental poetry
- journal writing
- storytelling
- use of computers
- oral language
- use of field guides, resource books, & literature relating to nature

MATHEMATICS
- graphing temperatures & flow of water
- measuring height, weight
- mapping outdoor area
- orienteering
- making up own word problems

PHYSICAL EDUCATION
- hiking
- playing games
- developing recreational skills

HEALTH
- personal hygiene
- outdoor safety rules
- group planning & social cooperation
- survival skills

VISUAL & PERFORMING ARTS
- pantomime & improvisation
- singing
- acting
- listening
- playing musical instruments
- sketching
- finding patterns in nature
- making collages
- painting
- expressing ideas/feelings

HISTORY-SOCIAL SCIENCE
- ethical concerns
- responsibility
- social participation
- citizenship
- local history
- future planning

SCIENCE
- process skills
- geology
- food chain
- weather observation
- energy sources
- constellation study
- flora & fauna study

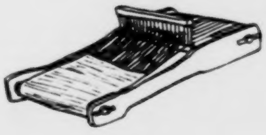
INTRODUCTION

RATIONALE FOR ENVIRONMENTAL AND OUTDOOR EDUCATION

Education is environmental when it increases the understanding of nature, culture, technology, people, ideas, and feelings about the environment. Environmental education is truly interdisciplinary, relevant to and part of every academic subject from kindergarten through college. Environmental education provides unique contributions to the purpose of all education: to contribute significantly to a person's ability to function effectively in society.

Environmental education programs aim at producing citizens who understand and appreciate their relationship to the environment, while also developing their critical thinking skills and commitment to constructive actions. While applying easy-to-understand ecological concepts, students develop holistic understanding, respect, appreciation, and concern for the natural, human, and cultural aspects of planet Earth. For example, one ecological concept is interdependence, meaning that everything is related to and dependent upon everything else. This concept can weave science through:

- social science by helping to understand human interactions with the environment
- language arts by providing a context for communicating knowledge, feelings, and ideas
- mathematics by providing opportunities to apply problem-solving skills



Thus environmental education is not a separate subject, but a theme that provides students with a comprehensive view of the world. Conservation education is often an alternative expression for environmental education.

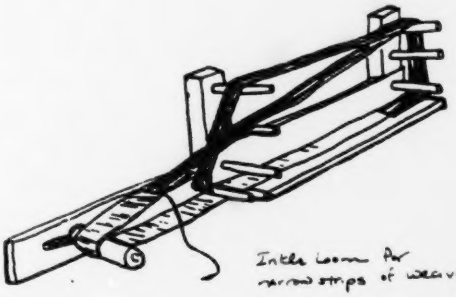
Providing ecological perspectives to learning in elementary grades is essential. This is the time that a significant amount of a child's attitude toward the environment tends to be formed (Miller, 1985). The development of a positive attitude is strongly correlated with the extent of environmental education received (Cohen, 1973).

Most people in the United States now live in large and middle-sized communities. The daily contact with basic natural resources that once characterized rural-oriented living is no longer prevalent. With urbanization, people tend to become less aware of their interdependence with the environment. Considering solutions to today's environmental problems, ranging from air pollution to pesticide abuse to urban congestion to toxic wastes, requires citizens who are concerned and knowledgeable about the interdependence with the environment. A critical need exists for an educational approach that includes experience in a natural environment.

Outdoor education is the important facet of environmental education that allows children a unique, firsthand learning opportunity in the out-of-doors. Although outdoor education could include activities done anywhere out-of-doors, including the school site, its application here is focused on the resident outdoor school program whereby students, usually in grade 5 or 6, have the opportunity to live and work together in an outdoor setting. The program commonly lasts for five days and four nights. The outdoor school curriculum is supported and strengthened by activities performed by students in the regular classroom and at home before and after the intensive outdoor experience.

Resident outdoor schools began in California in the mid-1940's. The movement for this learning experience gained momentum as more outdoor schools became established throughout the state over the years. The majority of attendees has been in sixth grade. The programs have had a variety of names including camp, science and conservation school, and resident outdoor science school. In this guide, resident outdoor school is the generic name for all of these outdoor programs. During the 1983-84 school year, more than 60 of these programs operated in California, serving about 140,000 students. Twenty-five of these programs were local education agency sponsored (Orange County Department of Education, 1986). The increase in the number of students attending resident outdoor school has continued despite such negative factors as:

- decreased emphasis on science instruction for several years
- diminished funding sources for education
- increased cost per student to attend outdoor school
- declining enrollment in some school districts



Inkle loom for narrow strips of weaving

The continued growing interest in and commitment to the resident outdoor school demonstrate its valued approach to learning.

This curriculum guide serves as a framework for the valuable contribution of the resident outdoor school to the environmental education of students, and is supported by the California Education Code:

> The Legislature finds and declares that an educational program is needed which is designed to build necessary attitudes of stewardship toward the maintenance of the quality of our common environment and to enable all citizens to use wisely, and not destructively, the resources at their disposal.
>
> California Education Code 8702

> The Legislature finds and declares that conservation education should be a means of achieving an educational philosophy that will help each student develop a healthy attitude of personal responsibility toward his environment and its resources and provide him with the concepts, the knowledge, and the skills needed to contribute meaningfully to the decision-making process on issues involving the environment and its resources.
>
> California Education Code 8705

CONTRIBUTIONS OF RESIDENT OUTDOOR SCHOOLS

As educators, you will be pleased to find that the resident outdoor school:

-- provides an ideal opportunity for students to learn concepts from life, earth, and physical sciences, along with the process skills, as specified in the 1984 Science Framework Addendum for California Public Schools and California's 1987 Model Curriculum Guide

-- fosters the integration of science with other subject areas including language arts, health, mathematics, social studies, art, music, reading, and physical education

-- meets the state requirement for many objectives in the California State Department of Education Frameworks: Science, History-Social Science, Health, English-Language Arts, Mathematics, Physical Education, and Visual and Performing Arts

-- prepares students to meet California Assessment Program (CAP) test criteria, especially in science and social science

-- provides an aesthetic opportunity whereby children establish an effective basis for continued enlightenment about the environment

-- promotes environmental awareness, knowledge, attitudes, skills, and participation, as well as developing problem-solving strategies

-- contributes to the development of group socialization skills

-- develops lifelong learning skills for effective citizenship

-- fits the needs and the differences of middle grade students concerning styles of learning; social, mental, and physical maturity; academic skills; and interests

ORGANIZATION OF GUIDE

This guide is divided into three useful sections.

Section I. The Outdoor Education Perspective. This section addresses the informational needs of administrators and curriculum specialists. It includes a definition of, and outcomes for, outdoor education; a description of a resident outdoor school; a review of relevant research and learning theory; and consideration of ways to maximize the impact of the outdoor school.

Section II. The Curriculum for Resident Outdoor Schools. This section outlines the California State Department of Education components as they apply to the resident outdoor school curriculum. It also includes pre- and post-outdoor school lesson plans and other curricular ideas for the classroom teacher.

a. Components from seven California frameworks are listed and correlated to the curriculum topics and processes of the resident outdoor school. A core curriculum was developed on the basis of a survey of California Outdoor School Administrators and a review of curriculum documents.

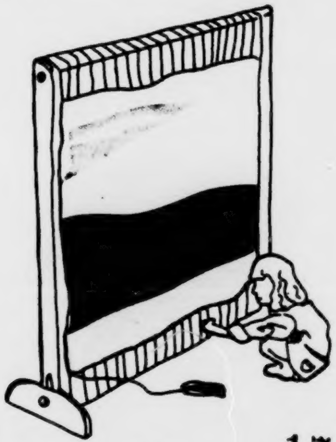
b. Sample lesson plans for suggested pre-outdoor school activities are provided which are effective in preparing students for a comprehensive outdoor education experience.

c. Sample post-outdoor school activities are provided which reinforce and extend the outdoor school experience.

d. Suggestions for intertwining technology with outdoor school related experiences are presented.

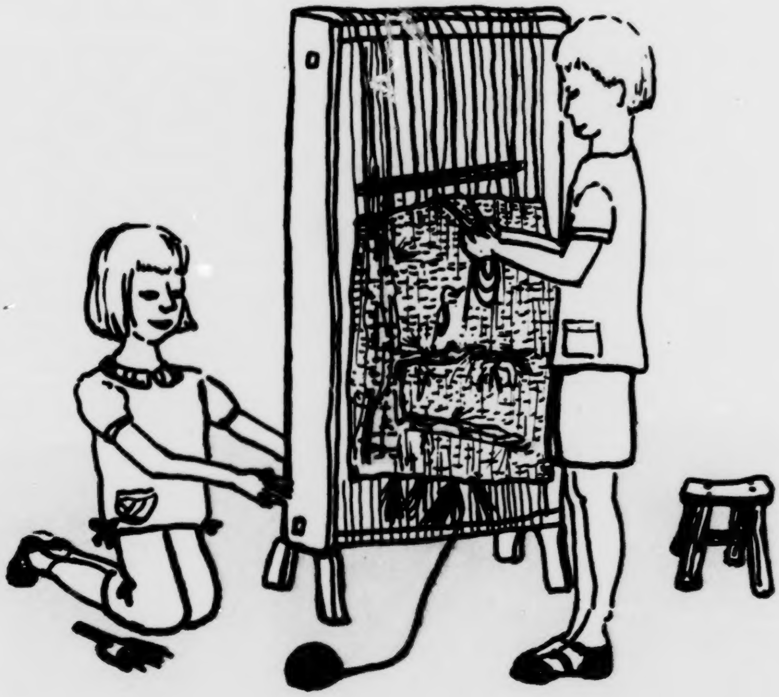
e. Guidelines that enable students to make better photographs at the outdoor school are included.

Section 3. Parental Involvement with Outdoor Education. This section articulates to teachers and administrators effective avenues to involve parents in supporting and facilitating the outdoor education program. Parent support is essential for two reasons: (a) initial orientation and commitment to the concept of outdoor school; and (b) engagement in home activities that support and extend outdoor school learnings. Guidelines are presented, along with suggested learning activities.



SECTION I

THE OUTDOOR EDUCATION PERSPECTIVE



CHAPTER 1

FOCUSING ON RESIDENT OUTDOOR SCHOOLS: DEFINING THE WHAT, WHY, AND HOW

This guide reflects an awareness within education and society for the need to develop environmental concern and action. Here we address what is often regarded as an essential element of an environmental education program -- the resident outdoor school.

DEFINITION OF OUTDOOR EDUCATION

The comprehensive definition of outdoor education, in which the resident outdoor school functions as the implementation component, is:

> Outdoor education occurs in a unique learning environment where students experience firsthand, action-oriented learning which takes place primarily in the out-of-doors at a resident outdoor school site. All curriculum areas are utilized in an interdisciplinary manner to increase awareness, knowledge, and attitudes and to develop critical thinking skills and actions related to the physical and biotic environment. The objectives for students are: (1) to practice skills in making rational decisions in group living and work settings and to evaluate personal choices; and (2) to develop knowledge, positive attitudes, appreciations, and action behaviors involving their stewardship responsibility for the natural environment.
>
> The outdoor school curriculum is supported and strengthened by carefully selected activities performed by students in the regular classroom and at home before and after the intensive outdoor experience.

The above definition includes the essence of several historical perspectives on outdoor education.

> "That which can be learned in the classroom should be taught there, and that which can best be learned in the out-of-doors should there be taught."
>
> L. B. Sharp, the father of outdoor education, 1943
>
> "Education in, about, and for the outdoors."
>
> G. E. Donaldson and L. E. Donaldson, 1958
>
> "Outdoor education is a means of curriculum enrichment through experiences in and for the outdoors. It is not a separate discipline with prescribed objectives like science or mathematics."
>
> J. Smith, 1970

However, these earlier definitions did not adequately address the socialization outcomes from attending a resident outdoor school and the development of a stewardship ethic for the natural resources by children.

The new definition is based on the premise that outdoor education:

- -- is a method of learning with a broad spectrum of outcomes
- -- includes firsthand, sensory experiences
- -- is often done out-of-doors at a resident outdoor school
- -- is interdisciplinary
- -- is concerned with relationships among people, and between people and the natural environment
- -- has scope and sequence

The valuable learning contributions of outdoor education have been recognized through California legislative enactments.

> It is the intent of the Legislature to encourage development of education programs for teachers and students commensurate with the importance of protecting scarce resources and safeguarding the quality of our environment.
>
> California Education Code 8707
>
> The governing board of any school district may conduct programs and classes in outdoor science and conservation education within or without the boundaries of the school district (authority for personnel, supplies, property, contracts, transportation).
>
> California Education Code 8760 (a,b,c,d)
>
> The county superintendent may provide programs and classes in outdoor science and conservation education, and coordination services (authority for funding, property, personnel, supplies, contracts, leases).
>
> California Education Code 8764 - 8773

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GOALS FOR RESIDENT OUTDOOR SCHOOLS

Resident outdoor school programs provide enjoyable, discovery-oriented learning environments through which the following goals can be achieved:

-- Develop a comprehensive understanding of ecological concepts and their relationships.

> Students learn central concepts about life, physical, and earth science through actual experiences in outdoor activities.

-- Promote positive attitudes toward the out-of-doors.

> Students find a deeper sense of serenity, inspiration, and spiritual well-being as they become aware of the beauty, the majesty, and the exquisite order of the natural surroundings.

-- Stimulate critical thinking.

> Students acquire an understanding of, and problem-solving skills related to, conserving natural resources.

-- Facilitate intergroup respect and understanding.

> Students, coming from separate schools, different economic levels, and varied social, racial, and cultural groups, gain increased understanding and appreciation of one another as they live, work, study, and play together.

-- Improve peer socialization.

> Students recognize the worth of group action in planning solutions for problems, sharing ideas, setting standards, and evaluating the results of planned activities.

-- Promote positive self-concept.

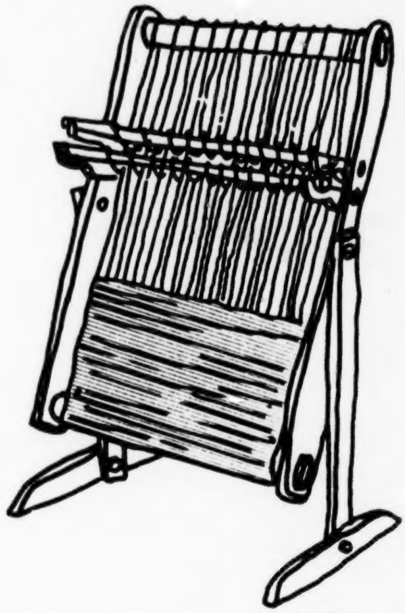
> Students gain feelings of self-sufficiency and importance as they master new skills and learn to take care of their own health and safety needs at the outdoor school.

-- Improve relationships between teacher and students.

> Students and teacher, while living together in a 24-hour environment, gain new insights about one another, thus improving subsequent classroom relationships.

These goals are achieved because the outdoor education curriculum is success-oriented. Students spend their time doing activities, rather than just reading and discussing. Students of all academic abilities are motivated by the active approach and experience success. They do activities at the outdoor school which cannot be accomplished in the regular classroom. In this curriculum, students experientially study books without covers: the land, water, night sky, plants, and animals. The outdoor trails and accommodations support the curriculum; indoor facilities support and extend the field experiences. Students should be aware of the goals of the outdoor education experience and their relationship with the other grade-level curriculum. The curriculum at the outdoor school:

- involves action and "hands-on" learning -- working, playing, exploring, discovering, creating, conserving, sharing, evaluating, and problem-solving
- uses a multi-sensory approach to promote curiosity and to develop a protective and compassionate attitude toward the environment
- is centered around the students' needs and interests
- includes experiences of many types which stimulate new interests
- promotes intrinsic motivation through use of the immediate natural environment
- includes integrated experiences that meet the California State Department of Education goals and objectives in all curricular areas and emphasize the interrelationship of subject matter areas
- uses the processes of science, including observing, communicating, comparing, organizing, relating, and inferring



Upright Navajo-type loom.

Outdoor school provides a vital program of living, learning, and working together which encompasses a purposeful curriculum. The program meets the goals and objectives identified in the California State Department of Education curriculum frameworks and demonstrates the interrelationship of subject areas. A brief overview of curricular applications to the California frameworks, some of which are unique to outdoor school, is presented in Table 1. In reviewing Table 1, it becomes apparent that the "basics" of reading, writing, mathematics, and other curricula are taught using another basic -- the environment. A complete and extensive correlation of these applications is provided in Section II, Chapter 1, of this guide.

TABLE I

Sample of Correlation of the Outdoor School Curriculum to California State Frameworks[1]

Framework	Goals/Components	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Science Framework and Addendum	Attainment of positive attitudes toward science.	Observe and appreciate the beauty of the area and the night sky. Apply science learning to future hobbies or interests (bird watching, animal care, hiking, etc.).
	Attainment of rational and creative thinking processes.	Use the scientific inquiry method: hypothesis, research, experiment, and conclusion.
		Observe, identify, and classify plants, animals, protists, and nonliving things using the senses and scientific equipment.
		Compare soils, slope effect, climatic, and vegetative differences in various environments.
	Attainment of manipulative and communicative skills in science.	Use scientific apparatus: microscopes, telescopes, binoculars, hand lenses, weather instruments.
		Report and discuss in study trail groups, after observing, measuring, and recording information.

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[1] See Section II, Chapter 1 for a complete correlation.

Framework	Goals/Components	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Science Framework and Addendum (Continued)	Attainment of science knowledge.	Biological Science: -- Observe adaptations of plants and animals. -- Apply knowledge about photosynthesis and plant structure. -- Recognize food chains and webs. Earth Science: -- Observe and discuss the moon, planets, and constellations. -- Observe, classify, and compare rocks and minerals. -- Examine and analyze soil types and related plant growth. Physical science: -- Study forms of energy and energy conversions in food chains. -- Practice conservation of energy, identify alternative sources of energy, and relate energy use to environmental consequences.
History-Social Science	Knowledge and cultural understandings.	Interact with other individuals, including those from different cultures, races, and backgrounds. Explore the history of the area and study the people who lived there in the past.
	Skills attainment and social participation.	Participate in a variety of success-oriented activities with other students and practice courtesy, consideration, and cooperation in group living situations.
	Democratic understanding and civic values.	Experience social living which implements the democratic process. Participate in decision-making, goal setting, and rule establishing for group life.

Framework	Goals/Components	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
English-Language Arts	Prepare students to function as informed and effective citizens in our democratic society.	Practice communicating skills in small groups; discuss thoughts, feelings, ideas, concepts, and issues. Study a variety of subjects.
	Prepare students to function effectively in the world of work.	Use outdoor experiences as a basis for recording data and writing in journals.
	Prepare students to realize personal fulfillment.	Participate in multisensory experiences which encompass all styles of learning and utilize a variety of communication modes (e.g., use of inquiry questioning techniques, environmental debates, creative writing and the arts, and dramatizations of environmental issues).
Health	Grow in self-awareness.	Discuss and evaluate the relationship between environmental quality and personal health.
	Develop skills for effective decision-making.	Participate in group planning and cooperation which promote personal growth and social development.
	Grow in coping action.	Participate in effective personal and group living (exercise, rest, nutrition, responsible behavior, and attitudes) provided through guidance by positive role models.
Mathematics	Promote understanding and enjoyment of mathematics.	Gather, record, and present weather information through use of scientific instruments.
		Observe and interpret geometrical forms and patterns in nature.
	Develop students' thinking and problem-solving skills.	Participate in an orienteering course. Calculate stream flow and/or dimension of a pond.

Framework	Goals/Components	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Physical Education	Improve motor skills and physical fitness.	Hike study trails and participate in group recreational activities.
	Develop a positive self-image.	Participate in success-oriented, non-competitive activities with many opportunities for individual attention, recognition, and positive reinforcement.
	Develop socially desirable behavior involving movement in interaction with others.	Meet students from other schools and participate in activities which develop desirable behavior.
	Develop interest and proficiency in using the skills essential for successful participation in worthwhile physical recreation activities.	Learn worthy use of leisure time and develop recreational skills.
Visual and Performing Arts	Develop a capacity to enjoy aesthetic expression in diverse forms and to feel comfortable participating in all of the arts.	Participate in arts and crafts activities, skits, storytelling, songs during campfire, and dances.
	Develop respect for originality in creative expression and sensitivity and responsiveness to the expression of others.	Cooperate with cabin members to produce skits; watch performances by other groups.
	Develop the capacity to experience aesthetic qualities in the environment.	Use materials from nature for arts and crafts.

VIEWING A RESIDENT OUTDOOR SCHOOL

The following is a glimpse into a typical resident outdoor school:

Middle grade students and their teachers are experiencing an extended four- to five-day, 24 hours a day, period during which they live, work, and learn together in a natural setting. As frequently as possible, activities take place outdoors and provide firsthand experiences.

During instructional time, students often work together in small groups with outdoor education specialists. They discover plant and animal life, different habitats, water sources, and geological features while also doing reading, writing, math, and art activities. Some typical activities might include the following:

- During a nature walk, students observe different kinds of plants and animals and learn about their characteristics and functions. Previous learnings regarding food chains and producer-consumer relationships are applied in this natural environment by using the process skills of observing, comparing, organizing, relating, and inferring. Students discover how Native Americans made use of the environment. Plaster of Paris casts of animal tracks, leaves, and flowers are made to extend their observation and classification skills.

- Geology is studied by examining rocks, inspecting soil profiles, and observing the formations revealed by roadcuts.

- Sources of water in the area are identified. Students trace the outdoor school water supply, measure stream flow, and use a microscope to observe microorganisms found in water. After discussion, they write about the importance of water and protecting the watershed.

- Students observe the weather by collecting measurements using scientific equipment at the weather station and then predict future weather.

- During night hikes, students have the opportunity to observe constellations, listen to legends, and use various senses to experience nature.

Students learn responsibility and cooperation, and increase self-esteem through successful group living experiences. Whether in a large or small group, each student is learning and practicing human relations skills by developing new friendships; establishing standards of courtesy and conduct; resolving conflicts; sharing and evaluating experiences. Some typical socialization experiences are:

- Groups of six to ten boys or girls are housed in separate cabins, each with a counselor. Each student is responsible for his or her own bed, cabin neatness, and personal cleanliness.

- Students eat balanced meals, while demonstrating manners and etiquette. They share meal duties by setting tables, acting as host, and cleaning tables.

-- Recreation includes hiking, enjoying a campfire, group singing, and folk or square dancing.

The educational activities will vary at each outdoor school because of differences in physical site, surrounding environment, weather, and season of year. However, the goals and objectives remain the same.

MAKING A COMMITMENT

After considering the exemplary and unique contributions that outdoor education provides for students, the positive choice for educators at school sites, school district levels, and county offices of education is to broaden their curricular offerings to include the resident outdoor school. The outdoor education program should never be regarded as the total environmental education program, but part of a program with scope and sequence. Many educators already have recognized the value of outdoor education and support the program both philosophically and financially. The California Education Code supports this choice.

> The Legislature finds and declares that without appropriate long-term funding, and without effective programs to encourage efforts and innovations at the school district level, and without needed materials and meaningful outdoor study opportunities, conservation education will remain a stepchild in the crowded family of public education.
>
> California Education Code 8703

Students may be able to participate in one of the many resident outdoor schools with exemplary programs which already exist throughout California. Individual schools and districts can develop their own outdoor school program, if so desired. A California State manual entitled Guide for Self-Appraisal and Certification of Resident Outdoor Science School Programs can be used to assist in developing and evaluating the outdoor school site and general educational procedures. The California Outdoor School Curriculum Guide should be used as the basis for selecting and evaluating curriculum.

CHAPTER 2

OUTDOOR EDUCATION: A SUCCESSFUL APPROACH TO LEARNING

The value of outdoor education is most clearly portrayed through scenes of a desired tomorrow. The environmental actions taken by tomorrow's adults will be patterned on the knowledge, emotions, and skills developed personally during youth. This chapter considers the environmental education needs of our future citizens and research-supported ways of meeting these needs.

PREPARING OUR FUTURE CITIZENS

The process and outcome of outdoor education connect human involvement with environmental quality. This interconnection is integral to the purposes of education in both science and social science. The purpose of history-social science education is:

> "Preparing students for responsible citizenship in comprehending global interrelationships, and in understanding the vital connections between past, present, and future."
>
> California's History-Social Science Framework, 1988

Preparing our citizens of tomorrow to be scientifically and technically literate is the focus of science education. According to science educator Dr. Paul Hurd (1985):

> "Science is no longer just for the scientist. Citizens are asked to make decisions on issues . . . such as energy sources, environmental conditions, health, safety, quality of life, and, possibly, human survival."

Project Synthesis was funded by the National Science Foundation to define the desired state of science education (Harms & Yager, 1981). Four major goal areas were identified:

> Personal Needs: Students will possess a variety of skills and procedures to make rational decisions and evaluate personal consequences.
>
> Societal Issues: Students will feel custodianship for the environment, recognize that science will not provide "magic" solutions or easy answers, and that hard work and the use of the processes of science may "resolve" problems.
>
> Academic Preparation: Students will develop an understanding of information and concepts from a wide variety of topics selected from life, earth, and physical sciences with many of these topics selected for the sole reasons that they are interesting to students at that age.
>
> Career Education/Awareness: Students will recognize that scientists and technicians are a heteregeneous, personal, and human group of people.

The first three of these goals are clearly identified with program characteristics of outdoor education. The outdoor education specialist or naturalist serves as a positive career model for students, thus supporting the fourth goal.

The National Science Teachers Association (NSTA) published a position statement on environmental education. This statement, presented below, addresses the real threat to our environmental quality and supports the effectiveness and necessity of firsthand interaction by students in learning activities about the environment -- the key component of a resident outdoor school.

POSITION STATEMENT OF THE NATIONAL SCIENCE TEACHERS ASSOCIATION

Environmental Education and the Use of Natural Resources in Science Teaching

It is increasingly evident that the quality of the biophysical and social environment is deteriorating at a rate that threatens human survival. Furthermore, an exponentially growing world population threatens even more rapid deterioration in the future. It must be recognized that science and technology will necessarily have an important role in solving these problems.

It is vital, therefore, that science educators concern themselves with environmental problems. For these reasons, the National Science Teachers Association urges the following actions:

I. It is imperative that students at all levels develop an understanding of how humans relate to natural systems, and realize the importance of making wise individual and social decisions in respect to the use of natural resources and the maintenance of environmental quality.

II. Science educators have a responsibility to help students establish a firm knowledge of fundamental scientific principles in order that they might better comprehend, explain, and predict the consequences of human actions on natural systems.

III. Firsthand interaction with terrestrial, aquatic, atmospheric, and human-designed components of the environment is considered both relevant and necessary for effective science teaching and learning. With such an experiential base, science educators can help students to develop the kind of reasoned thinking that will result in responsible decision making regarding human/ecosystem interaction.

IV. NSTA supports activities that promote increased awareness and responsible educational use of terrestrial, aquatic, atmospheric, and human-designed components of the environment.

Adopted by the NSTA Board of Directors in July, 1985

SUCCESSFUL OUTCOMES IN THE AFFECTIVE DOMAIN

The contributions of outdoor education in the affective domain are significant. The potential for good human relations is provided in countless ways at the outdoor school as part of the total living environment. Consideration of others and understanding of self are involved in desirable social and democratic behavior. Another key objective is the development of positive environmental attitudes. Consider the following responses from students, coupled with supportive research findings.

"I have made new friends."

> Socialization among sixth grade students improves during the outdoor school experience, much more than would be likely to occur in the regular classroom (Kranzer, 1958; Pieroth, 1955). This socialization has also been found to continue after the outdoor school (Fletcher, 1973) and to support the formation of many new friendships (Davis, 1960; Stack, 1960).

"I feel that living in a cabin with other students was worthwhile."

> Improvement of intergroup relations is facilitated by outdoor education experiences. The promotion of racial and cultural understanding by the development of mutual respect and understanding has been validated for middle school children (Acuff, 1976; D'Agostino, 1980; New York City Board of Education, 1948; Roller, 1966; Senior, 1971; Stack, 1960).

"I enjoyed getting to know my teacher better."

> Teacher-pupil relationships improve as both teacher and students observe and learn together as partners. This results in strengthened rapport (Kranzer, 1958; Stack, 1960) and increased motivation for classroom work (Davidson, 1965; Kranzer, 1958). The twenty-four hour contact, plus learning in small groups, provides an ideal opportunity for teachers to discover the unique characteristics of each student (Hollenbeck, 1958; New York City Board of Education, 1948). This can result in teachers reporting a positive growth in the attitude toward them by their students (Roller, 1966). Classroom teachers have reported improved school behavior and higher attendance levels among fifth and sixth grade students who attended outdoor school (Kriger, 1970).

"My classmates know me better and I like that."

> The impact of the outdoor school on self-concept and self-esteem is positive. Research with sixth, seventh, and eighth graders showed pronounced growth in their competence not matched by children who did not go to the outdoor school (Beker, 1960; Marks, 1971). Retesting ten weeks later with sixth graders demonstrated the strength of the outdoor school in that these positive feelings continued to increase (Beker, 1960).

Related to positive self-concept is high internal locus of control, which means that people believe they are in control of what happens to them. Several researchers have reported that students who attend outdoor school tend to increase their internal locus of control (Fletcher, 1973; Joynt, 1974; Nowicki & Barnes, 1970; Ulrey, 1974).

"I believe conservation of natural resources is important."

The outdoor school experience, coupled with regular classroom instruction, is more effective in improving conservation attitudes than classroom instruction alone for sixth grade students (Becker, 1977).

"I'd like to go to outdoor school again."

Learning in the out-of-doors can promote a more positive attitude-toward-the-environment. This attitude has been demonstrated to continue to increase after outdoor school, according to a three-month study done with sixth graders (Millward, 1973).

"Resident outdoor school is my most memorable educational experience."

Research has confirmed the value of outdoor education as a significant life experience. High school students who were fortunate enough to participate in sixth grade outdoor school rate it as their most important and remembered educational experience in school (Jefferson County Public Schools, 1983; Orange County Department of Education, 1982). Environmental professionals tend to choose their profession because of youthful outdoor experiences in pristine environments (Tanner, 1979).

Although the quantity of studies related to the affective value of outdoor schools is limited, their cumulative reported findings support the multifaceted affective potential for outdoor education.

When considering a taxonomy which defines a theoretical progression of values formation in the affective domain, Knapp's adaptation of Krathwohl's model (Knapp, 1983) suggests the following steps:

1. Receiving (including awareness, willingness to receive, and controlled or selected attention)

2. Responding (including acquiescence in responding, willingness to respond, and satisfaction in response)

3. Valuing (including acceptance of a value, preference for a value, and commitment and conviction)

4. Organization (including conceptualization of a value and organization of a value system)

Most of the research conducted has been related to the achievement of receiving and responding steps through participation in outdoor education. Evaluation strategies need to be designed to better assess the valuing skills and personal value systems developed as a result of outdoor education.

SUCCESSFUL OUTCOMES IN THE COGNITIVE DOMAIN

In terms of cognitive development, outdoor education has the support of several studies which suggest its importance in developing environmental concepts and increasing critical thinking. The following student comments, with collaborative research, represent cognitive outcomes.

"I understand more about environmental concepts."

> In support of learning environmental concepts in an outdoor education setting versus in a regular classroom are studies with middle school students (Huntoon, 1980; Morton, 1981) and tenth grade students (Peck, 1974).

"I am better able to make decisions related to the environment."

> Outdoor education has been shown to be effective in stimulating critical thinking for middle grade students (McNamara, 1971; Slater, 1972). Although the research is limited, it supports the general feeling held by outdoor educators that outdoor education offers valuable educational outcomes in critical thinking.

"I notice more about my environment."

> Research on process skills in outdoor education has been limited to demonstrating improvement in observational skills (Wise, 1970). The compilation of activities commonly done at outdoor school (Section II) shows that students, in reality, have an opportunity to practice most of the process skills as identified in California's *Science Framework Addendum.*

"The activities done before and after outdoor school helped me gain and apply new knowledge."

> The effectiveness of the outdoor experience was increased when preceded by learning activities which provide an advance organizer for subsequent learning (Goldsbury, 1969; Hosley, 1974; Howie, 1974; Slater, 1972). Perception training (exercises using various senses) before outdoor school resulted in students' spending more time reflecting on their outdoor experience and using more sensory words in verbal and written descriptions (Roth & Hodgson, 1977). A preinstruction program dealing with awareness activities, ecological concepts, and consequences of specific human behaviors has been shown to prepare students to demonstrate significantly more environmentally responsible behaviors (Asch & Shore, 1975). The value of reinforcing concepts learned in the out-of-doors with follow-up activities in the regular classroom has been demonstrated (Klippel, 1985).

MULTIMODAL APPROACH TO EFFECTIVE LEARNING

Recent discoveries in human mind-brain research have demonstrated that the most effective educational programs offer a wide range of strategies to engage learners. Students need to be able to learn using their preferred modality while increasing their ability in other modes. This holistic way to excite the mind-brain system has been expressed by the four modalities in the 4Mat System approach to teaching (Samples et al., 1985). These modalities are:

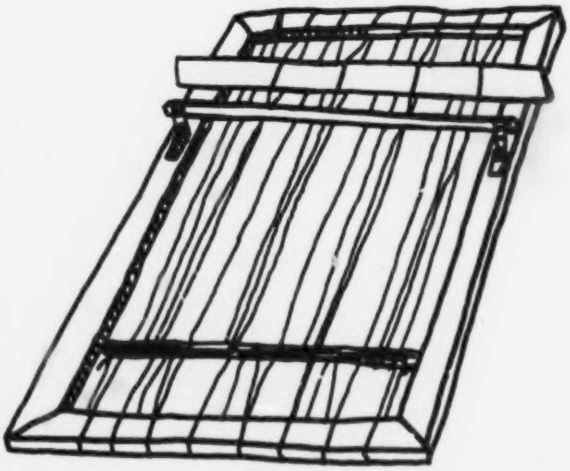
Symbolic/Abstract: Abstract codes such as numbers and letters (the three R's)

Visual: Visual-spatial expression such as art and mapping

Auditory: Patterned sound such as speech, music, and song

Kinesthetic: Patterned movement such as dance, body movement, and physical action.

The teaching techniques utilized at the outdoor school elicit the widest possible range of the brain's capabilities by addressing all learning modalities. This holistic learning enhances a student's development toward becoming a fully functioning individual. Thus, a greater understanding about the contribution of outdoor education to the learning, thinking, and lives of students can be achieved.



Frame Loom w/ Heddle bar

CHAPTER 3

FIFTH AND SIXTH GRADES: PREFERRED GRADE LEVELS FOR OUTDOOR SCHOOL

The aim of education is to provide children with the experiences that will help them become the best they can be -- socially, emotionally, and intellectually. Fifth and sixth grades traditionally have been most frequently selected as the "right" level for the outdoor school experience. This choice is due to several considerations, but primarily to the developmental characteristics of this age group in transition from childhood to adolescence. Research on attitude, value, and cognitive development shows that the middle years offer the greatest opportunities for acquiring knowledge and understanding about the environment (Kellert & Westervelt, 1983; Moore, 1977; Rejeski, 1982). The outdoor education program serves real needs for these young people -- and over the long term -- for society.

Based on Piaget's stages of development, most fifth and sixth grade students are concrete operational thinkers, but nearing formal thinking. Thus, the content of learning experiences should place major emphasis on direct interaction with objects and events with provisions for inferential thinking. Outdoor school gets the students out of the regular classroom and into ecological systems with hands-on activities. Through these types of experiences, students' understanding of the environment may change and grow from a self-centered point of view to an objective sense of how the natural world functions. Moral judgments about environmental issues can be examined in light of what is best for society. Substantial changes in the understanding of ecological concepts through attendance at outdoor school have been demonstrated for 10 to 12 year old children, but not validated for younger 8 to 10 year olds (Huntoon, 1980). Children may have their deepest relationships with the out-of-doors during the middle years (Moore, 1977).

The resident outdoor school facilitates the students' acquisition of scientific concepts and processes identified in the Science Framework Addendum and California's Model Curriculum Guide. Students utilize the process skills of observing, communicating, comparing, organizing, and relating to develop an understanding of interactions, principles, generalizations, and laws. They begin to use the process skill of inferring to make inferential judgments and predictions.

Fifth and sixth grade students are changing rapidly, both physically and mentally, and need to participate in activities that help them grow in personal responsibilty and self-esteem. Outdoor education provides an effective social context for these students to develop their own sense of self-worth and self-confidence, heightened by what is for most an extended first time away from their parents.

These children are learning to function as part of a group and to acknowledge group goals as relevant. Initial understanding of social responsibility for natural resources is facilitated by structured peer interaction. The students are able to acknowledge the effect of human intervention on the environment (Rejeski, 1982).

Fifth and sixth grade students tend to have increased and refined their psychomotor skills, in contrast to younger children. Outdoor activities utilizing a variety of manipulative skills can easily be accomplished.

The students are developing special interests and hobbies. The opportunity for development of life-long activities utilizing the out-of-doors can be facilitated by the outdoor school.

Consideration of practical reasons for fifth and sixth grades as the "right choice" for outdoor school includes the following:

-- It may be the most appropriate culmination activity to tie together the whole elementary school curriculum.

-- It provides an excellent "bonding" activity to promote student-student and student-teacher relationships.

-- Parents are more apt to let their child attend outdoor school than they would be if the student were younger.

-- The structure of an elementary school, with self-contained classes, may facilitate all the related planning and scheduling requirements. This is in contrast to the departmentalized junior high situation.

The acceptance of fifth and sixth grades as the statewide placement for the resident outdoor school would allow for the continued development of a uniform curriculum. It is recognized that other grade levels may be selected for the outdoor school and the curriculum adapted accordingly.

CHAPTER 4

MAXIMIZING THE POTENTIAL OF RESIDENT OUTDOOR SCHOOLS

Increasing the valuable outcomes of the outdoor school for the students can be achieved through the implementation of both short-range and long-range strategies. As a short-term approach, the outdoor school curriculum can be supported and strengthened by carefully selected activities performed by students in the regular classroom and at home before and after the intensive outdoor experience. This is part of the definition of outdoor education given in this guide.

Resident outdoor school should be considered an integral, but not sole, component of an environmental education program. The important, unique contributions of outdoor education can best be achieved as part of a comprehensive curriculum with scope and sequence. This long-term approach to environmental education means that, beginning in kindergarten, educational experiences would form a supporting network for maximizing the value of the outdoor school. Also, the experiences at outdoor school could provide a strong affective, and cognitive foundation for further study and critical thinking in environmental education at higher grade levels.

PRE- AND POST-ACTIVITIES: SHORT-RANGE STRATEGIES

The outdoor school is an extension of the regular classroom. Thus the outdoor school experiences should be integrated and closely tied to the regular classroom curricula. Pre- and post-activities for the outdoor school can be readily infused into the curriculum to meet the goals and objectives of all curricular frameworks. This means that no additional demands are placed on the school day, rather that a more efficient and effective use of time and resources occurs.

The pre-activities or "advance organizers" (Ausubel, 1968) provide the basic conceptualizations that have been shown to result in long-term positive changes in environmental knowledge and attitude (Gross & Pizzini, 1979; Howie, 1974). According to Piaget's work as explained by Flavell (1963), most learning occurs when a person's cognitive structure is prepared for new information.

The classroom teacher is responsible for providing structured programs to introduce the new experiences associated with the outdoor school. Lessons are provided in Section II, Chapter 2, of this guide which can be used directly or easily adapted by the classroom teacher. Many of these pre-activities emphasize academic preparation in scientific concepts, vocabulary, and process skills. The activity topics include: photosynthesis and food chains; food webs and other interrelationships; and adaptations of plants and animals. Other pre-activities include practicing journal writing, identifying expectations for the outdoor school, and reviewing outdoor behavioral standards. Suggestions on taking photographs and doing photographic projects have been included to assist students in increasing their success in this optional, but often done, activity (Section II, Chapter 5).

Lesson plans for post-activities (Section II, Chapter 3) in the regular classroom reinforce and extend the learnings from the outdoor school. Ecological concepts are applied, along with critical thinking skills, when students do the following: compare the habitat of the school grounds to the outdoor school; decide on a school site improvement; consider problems associated with habitat manipulation by humans; and apply a historical perspective to predict future trends in their local area. Other post-activities involve reviewing positive experiences concerning the outdoor school and writing a newsletter.

The increasing availability of technology, especially in the forms of interactive videos, instructional television programs, laser discs, and computer software, brings the distinct possibility for its use in preparation for, during, and in follow-up to the outdoor school. Pre-activities can include learning ecological concepts by studying computer programs and/or watching educational videos. Experience in using technology could prepare students for its application during and after outdoor school. Follow-up activities include producing spreadsheets for collected data and writing programs to produce low or high resolution graphics of the animals and plants studied. Stories and reports about outdoor experiences can be written utilizing word processing software. Suggestions for technological applications are provided in Section II, Chapter 4.

The home environment is one of the most important influences on the development of a child's cognitive and affective characteristics (Bloom, 1981). The pre- and post-activities in Section II include suggested homework assignments that students can complete with parent involvement. Home learning activities are also provided in Section III.

A CURRICULUM FOR ALL STUDENTS

To believe that outdoor education is a privilege of just a few denies the universal satisfaction felt in experiencing a natural environment. Through an intensive group living experience, young people are helped in learning how to live in harmony and mutual respect with others. Educators should provide the opportunity for children to participate in this out-of-doors experience, and children must not be denied attendance because of financial need. The outdoor school is a positive learning environment for all children, including those individuals who are in gifted, limited-English, or special education programs.

Integration of special education students with regular students in an outdoor school setting is in direct compliance with Public Law 94-142. However, because of the outdoor environment, it is recommended that the students be able to take care of their own physical needs, hike the trails at the group's pace and take part in scheduled programs. Any exceptions to this recommendation should receive special approval from the local educational agency and resident outdoor school administrator. It is recommended that outdoor school personnel consider appropriate building modifications and program structuring that would facilitate attendance by children with special needs.

INSERVICE EDUCATION FOR TEACHERS

Teachers need to perceive the value of outdoor education to their students and the importance of the role that they play in maximizing the educational benefits for the students. They also must acquire skills to effectively teach appropriate, related lessons and to participate in the outdoor school program. Inservice education is an ideal strategy through which teachers can achieve these necessary attitudes and skills. Since the pre- and post-activities taught by the teachers need to support the out-of-doors learning, the involvement of outdoor school personnel in planning and/or providing inservices is considered desirable. Inservice programs and experience in outdoor programs have been shown to be effective in promoting positive teacher attitudes about the value of environmental education programs (Bethel et al., 1982).

THE PRINCIPAL'S ROLE

Active leadership by the principal in supporting the implementation of the outdoor education program produces effective programs (Hounshell & Liggett, 1976). As the school leader, the principal should communicate this as a priority of the school to teachers, students, and parents. Leadership is necessary in all aspects: teacher inservices, parent orientation, outdoor school arrangements, and evaluation.

Principals must be sure to provide direction in dealing with three factors that often discourage teachers from utilizing outdoor schools (Yockers, 1980): planning time, financial costs, and, for self-taught programs, size of classes. Success in dealing with these concerns will enhance the enthusiasm with which teachers approach the outdoor school. Teachers who have positive attitudes toward attending outdoor school feel that the principal and school district and/or county office of education adequately support the program and that the activities are valuable to students.

EVALUATION

Evaluation and program accountability often seem to go hand-in-hand. Outdoor education has not tended to have rigorous, quantitative evaluation in the past. Subjective judgments by teachers and administrators have been common. Attitudinal, social, ethical, and action outcomes do not readily lend themselves to "paper-and-pencil" testing. Measurements of growth in science knowledge have been done, but this testing has not tended to include critical thinking skills.

A variety of assessment techniques should be considered and utilized each year to validate the success of the outdoor education program. These include, but are not limited to:

1. Written evaluation by all involved -- students, parents, teachers, administrators.

2. Pre- and post-testing of students' knowledge in environmental science, including questions assessing critical thinking.

3. Sociograms to detect changes in interaction patterns within the class.

4. Interviews with and/or anecdotal records on individual students.

5. Pre- and post-testing of interests and attitudes of students and teachers related to outdoor education.

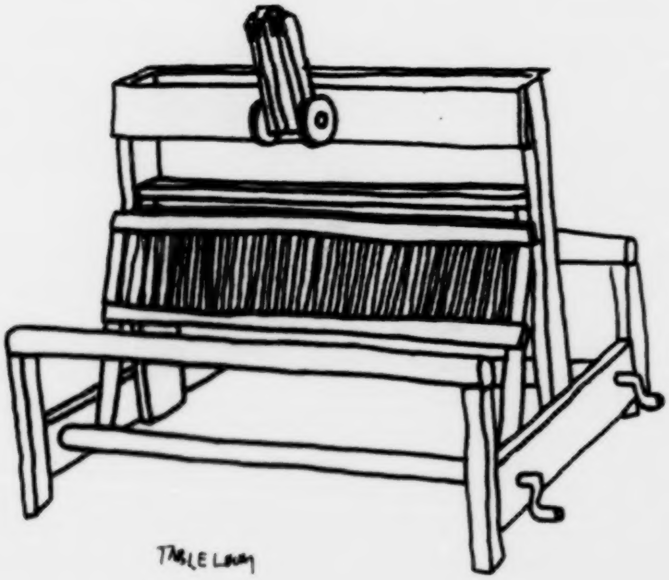
6. Quality of writing and projects facilitated by attendance at outdoor school.

7. School attendance levels before and after outdoor school.

8. Longitudinal study of students and their parents after several years.

9. Extent of positive parent support and participation related to the program.

10. Extent of pre- and post-activities done by students in the classroom and at home.



THE COMPREHENSIVE APPROACH TO ENVIRONMENTAL EDUCATION: LONG-RANGE STRATEGIES

Environmental educators and classroom teachers agree that the achievement of environmental literacy should be an important component of every child's education (Champeau et al., 1980; Volk et al., 1984). Yet these studies show that this goal for environmental education is not being met to a large extent in existing curricula. To accept environmental literacy as a desired goal of education means addressing the challenge of this goal in schools. The model curriculum for environmental education which includes the resident outdoor school in fifth or sixth grade is the appropriate and beneficial choice.

The goals for curriculum development in environmental education, presented below, are hierarchical in nature (Hungerford et al., 1980). It is necessary to provide students with sufficient ecological knowledge and positive environmental attitudes first (Level I). Later, students can evaluate issues and solutions by participating in problem-solving situations (Level IV). The resident outdoor school promotes and links together essential, effective, and cognitive experiences in this hierarchy of goals.

GOALS FOR CURRICULUM DEVELOPMENT IN ENVIRONMENTAL EDUCATION

The Superordinate Goal: . . . to aid citizens in becoming environmentally knowledgeable and, above all, skilled and dedicated citizens who are willing to work, individually and collectively, toward achieving and/or maintaining a dynamic equilibrium between quality of life and quality of the environment.

Level I. Ecological Foundations Level

This level seeks to provide the receiver with sufficient ecological foundations knowledge to permit him/her to eventually make ecologically sound decisions with respect to environmental issues.

Level II. Conceptual Awareness Level -- Issues and Values

This level seeks to guide the development of a conceptual awareness of how individual and collective actions may influence the relationship between the quality of life and the quality of the environment and, also, how these actions result in environmental issues which must be resolved through investigation, evaluation, values clarification, decision-making, and finally, citizenship action.

Level III. Investigation and Evaluation Level

This level provides for the development of the knowledge and skills necessary to permit receivers to investigate environmental issues and evaluate alternative solutions for remediating these issues. Similarly, values are clarified with respect to these issues and alternative solutions.

Level IV. Environmental Action Skills Level -- Training and Application

This level seeks to guide the development of those skills necessary for receivers to take positive environmental action for the purpose of achieving and/or maintaining a dynamic equilibrium between the quality of life and the quality of the environment.

School district commitment is vital to the establishment of a comprehensive program of educational experiences in environmental education. Steps to achieve this commitment include:

1. Forming a district environmental education committee with wide representation.

2. Seeking consultant assistance from experts.

3. Establishing district philosophy and goals regarding environmental education, along with identifying appropriate program and instructional objectives.

4. Allocating resources to implement and evaluate program.

5. Providing inservices to teachers and administrators.

Several programs are available that would provide a good beginning to the development of a comprehensive environmental education curriculum. These programs are not complete in themselves and must be integrated with other instructional programming. They have been correlated with California's Science Framework Addendum and have an inservice requirement. Information on these programs can be obtained from the Consultant in Environmental Education, California State Department of Education. Recommended programs include:

-- Project Learning Tree, developed by the American Forest Council, Inc., and the Western Regional Environmental Education Council (K-12 grades)

-- Project WILD and Aquatic Supplement, developed by the Western Association of Fish and Wildlife Agencies and the Western Regional Environmental Education Council (K-12 grades)

-- The California Version of the CLASS Project, produced in collaboration by the National Wildlife Federation, the California State Department of Education, and the Orange County Department of Education (6-9 grades)

-- The California Environmental Education Guide, developed by the Office of Alameda County Superintendent of Schools in cooperation with the California State Department of Education (K-6 grades)

The use of technology should be a component of a comprehensive environmental education program at all grade levels. The development of ecological concepts and the investigation of environmental problems can be significantly enhanced through the use of technology. Appropriate software, laser discs, and videos are constantly being developed and are important instructional tools.

PRESERVICE EDUCATION FOR TEACHERS

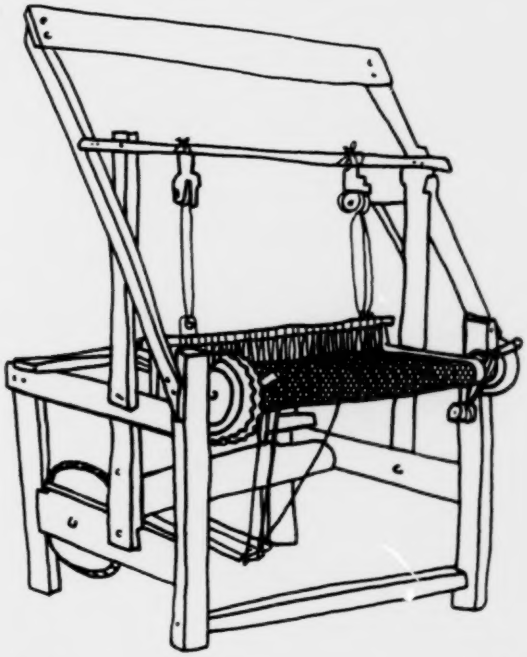
Preservice programs have the responsibility for preparing teachers who will be committed to planning and implementing effective and exciting environmental education programs. Prospective teachers need opportunities to develop their attitudes toward, and understanding about, environmental concepts just as will their future students. Thus instruction on the content of and teaching strategies for environmental education should be infused into teacher education courses concerning curriculum, methods, and child development.

EFFECTIVE INTERDEPENDENCE

The business of education is teaching children to read, write, and calculate, along with educating them about society, their place in it, and their responsibility for learning how to make decisions and to solve problems. The resident outdoor school education program provides a unique catalyst for these kinds of applied, real world learning experiences.

Outdoor education links to, is affected by, and affects:

STUDENTS
teachers, administrators,
parents and community,
district philosophy and goals,
the board of education,
legislators,
all other programs,
the budget process,
scope and sequence of environmental education,
planning and evaluation process,
COMMITMENT



Double Heddle Floor Loom (Museum of Man San Diego)

SECTION II

THE CURRICULUM FOR RESIDENT OUTDOOR SCHOOLS

BEST COPY AVAILABLE

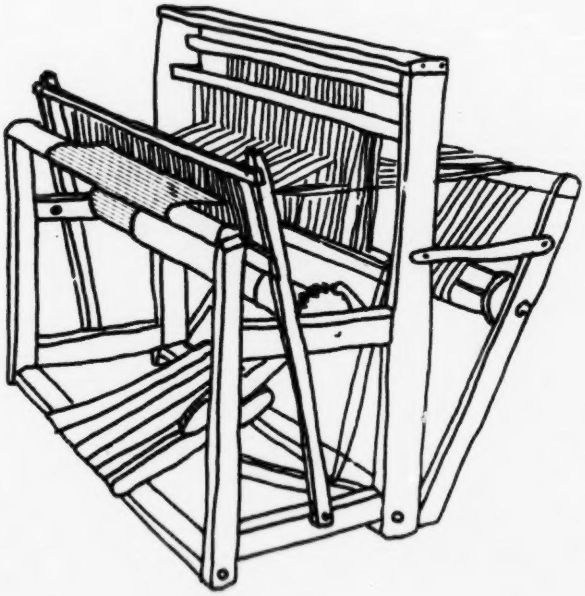
CHAPTER 1

CORRELATION OF THE RESIDENT OUTDOOR SCHOOL CURRICULUM TO CALIFORNIA STATE FRAMEWORKS

The San Diego County Office of Education conducted a survey in 1986 to determine which components in various California curriculum frameworks were most applicable to a resident outdoor education program. The California curriculum frameworks were reviewed, and major components including goals and concepts were summarized in a questionnaire. Questionnaires were sent to members of the California Outdoor School Administrators (COSA) representing over 30 California resident outdoor schools.

Components listed in this chapter represent the results of 26 respondents from 23 resident outdoor education programs in California. Some components have been updated to reflect new 1987 and 1988 framework documents. Most of the components listed on the left side of the following charts are quoted directly from the corresponding framework.

Examples of resident outdoor school curriculum topics, activities, and processes are correlated to each framework component. These examples were compiled from outdoor school handbooks and other environmental education publications. References are listed in Section IV of this guide. Each outdoor school site and program is unique and therefore topics, activities, and procedures at different outdoor schools may vary.



Floor Loom

SCIENCE FRAMEWORK ADDENDUM COMPONENTS AND CURRICULUM APPLICATIONS TO RESIDENT OUTDOOR SCHOOLS

The California State Department of Education's Science Framework (1978) specifies four main goals of science instruction: achieving positive attitudes toward science; achieving rational and creative thinking processes; achieving manipulative and communicative skills in sciences; and achieving scientific knowledge (p. 25). The residential outdoor education program is an ideal setting for the reinforcement of these goals. Activities are designed to be fun as well as educational. Students practice rational and creative thinking processes as they use their senses and scientific instruments to explore and analyze the natural environment. They communicate observations by writing in their journals and/or participating in small group discussions. Outdoor instructional activities in nature provide hands-on participatory learning in biological, earth, and physical sciences.

Twelve of the eighteen content areas listed in the Science Framework Addendum (1984) have been identified as important in a residential outdoor education program. The major content areas include: Science, Technology, Individuals, and Society; Biological Science; Earth Science; and Physical Science. In addition, all process skills and some ethical considerations listed in the Science Framework Addendum were also considered important elements that should be included in outdoor school curricula.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Goals of Science Instruction		
Achieving positive attitudes toward science.	1	o Participate in interesting and fun science activities.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Achieving rational and creative thinking processes.		o Use the scientific inquiry method: question, research, hypothesis, experiment, and conclusion. o Observe, identify, and classify plants, animals, rocks, soils, etc.
Achieving manipulative and communicative skills in science.		o Demonstrate correct use of scientific instruments such as microscopes, telescopes, binoculars, hand lenses, weather instruments, etc. o Communicate observations by writing in journals and participating orally during small group discussions.
Achieving scientific knowledge.		o Experience participatory hands-on learning in biological, earth, and physical sciences.
Process Skills		
Observing: Seeing Hearing Feeling Tasting Smelling		o Use senses to discover and absorb information about the environment. o Observe living and nonliving things. o Explore an area blindfolded. o Participate in solitary experiences which provide time to observe and use the senses on day hikes or on a night walk. o Look for animal evidences, feel textures of tree bark, smell flowers, taste edible plants, and listen to sounds in a forest.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Communicating: Silent Oral Written Pictorial	4	o Present information in nonverbal form. o Use silent communication on a bird walk and/or night walk. o Learn the nonverbal signal for being quiet and listening. o In small groups, discuss information, ideas, thoughts, and issues about the environment. o Write: in journals, in handbooks, letters to family and friends, poems, stories, descriptions, legends, songs, or skits. o Illustrate a water cycle, a food chain or web. o Draw a creature with specific adaptations. o Create art forms from natural materials. o Sketch natural scenes.
Comparing: Sensory comparison	4	o Use senses to discriminate between natural objects and/or sounds. o Compare characteristics of various ecosystems. o Compare: plants by color, shape, size, and texture; soil by color, texture, and absorption properties; the environment at night and during the day.
Organizing: Data gathering Sequencing Grouping Classifying	4	o Predict weather patterns. o Gather data on plants, animals, ecosystems, stream flow, nonliving things, etc. o Sequence verbally, pictorially, and in writing: animal and/or plant life cycles, food chains/webs, water and other cycles, the order of the planets from the sun, moon phases, succession, etc. o Group plants, animals, protists, and nonliving things (e.g., rocks, soil type, stars). o Classify living and nonliving things: plants, animals, protists, rocks, soil layers, plant parts (pine cones, leaves), etc. according to specific criteria based on observation and interpretation.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Relating: Using space-time relationships Formulating experimental hypothesis Experimenting	4	o Participate in orienteering (learning relationships between map and compass to determine direction and distances). o Interpret growth rings. o Observe evidences of succession. o Predict the weather. o Hypothesize about succession of an area, the future of our natural resources, the age or height of a tree, etc. o Perform experiments on water, soil, plant transpiration, etc. o Use senses and scientific equipment to gather data and to analyze results of experiments.
Inferring: Analyzing Generalizing Recognizing and Predicting Patterns Theorizing	4	o Analyze weather data and/or other data acquired on study trails. o Make generalizations concerning gathered data (e.g., adaptations of animals and plants observed on a study trail). o Recognize and predict patterns in nature such as: arrangement and shape of leaves, spacing of tree rings, food chains, water cycle, crystal structure, weather patterns, constellation patterns, etc. o Theorize about adaptations of plants and animals. o Infer geological history. o Interpret changes (natural or those caused by humans).
Applying: Using Knowledge to Solve Problems Inventing	4	o Participate in keeping the environment clean and healthy at the outdoor school, on regular school grounds, and in the community by picking up trash and by practicing other conservation measures. o Invent a creature with specific adaptations.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Science, Technology, Individuals and Society		
Instruments devised by technologists have greatly broadened and deepened the scope of scientific investigation; e.g., microscopes, telescopes, and computers.	9	o Demonstrate the correct use of scientific instruments which may include: microscopes, stereoscopes, bioscopes, binoculars, compasses, telescopes, hand lenses, weather analyzing and predicting tools, geology equipment, soil and water testing equipment, and thermometers. o Use the instruments to gather data.
Classification systems are developed to help organize information about objects, organisms, and events.	10	o Recognize that all classification systems are based on how objects, organisms or ideas are similar and different by placing objects and/or ideas into groups or categories. o Using senses and scientific equipment, observe and then classify plants, animals, protists, and nonliving elements such as rocks, soils, etc.
Application of science and technology to solve human problems can create other problems. Examples are overpopulation, depletion or pollution of soil, and traffic hazards.	11	o Discuss what technological advances have created environmental problems, describe these problems, and propose some solutions.
Biological Science -- Cells, Genetics, and Evolution		
Living things have adaptations that enable them to live in their particular habitats.	15	o Participate in instructional activities to identify and understand the adaptations of plants and animals. o Distinguish between a physical and a behavioral adaptation. o Observe and study the effect of protective coloration of animals.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
The complex structures and processes that characterize living things require energy to grow and maintain them.	16	o Observe and identify energy sources for various living things and predict what will happen to an organism when its energy source is eliminated.
Biological Science -- Plants		
Plants have adaptations that enable them to obtain and store water, produce and store food, protect themselves against predators and parasites, receive sunlight, minimize the effects of extreme temperatures, reproduce, etc.	22	o Observe adaptations of plants and describe their purposes. o Compare adaptations of plants in one plant community (e.g., forest) to another plant community (e.g., meadow). o Illustrate or create a model of a plant with specific adaptations for a specific habitat.
Roots anchor plants and absorb minerals and water from soil. Some roots store food. Roots help hold soil in place.	22	o Describe the functions of roots. o Observe and compare eroded areas to areas where plant roots prevented erosion. o Build a root display box.
Stems support plants and transport their fluids.	22	o Observe stems (trunks) of trees and discuss the function of stems. o Participate in a game which illustrates the transportation of fluids up and down the stems.
Leaves absorb sunlight and produce the plant's food.	22	o Observe leaves and their position to the sun; discuss their function. o Describe and relate leaf shape, cuticle, and size. o Measure and compare leaf size.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Chlorophyll, the green matter in plants, enables plants to absorb sunlight and produce food.	22	o Observe and make inferences about the various shades of green in leaves. o Locate plants without green coloring and interpret how they survive.
Photosynthesis renews oxygen to the atmosphere and to bodies of water while using up the waste products of plant and animal metabolism.	24	o Participate in a game which shows what plants need in order to photosynthesize. o Conclude the importance of plants as oxygen renewers.
Flowers are plants' reproductive organs, producing male and female sex cells that can unite and develop into new plants.	22	o Observe flowers and/or seeds. o Participate in an activity which shows parts of a flower and how seeds travel or participate in other activities illustrating flower parts and/or seeded adaptations. o Diagram parts of a flower.
Seeds require certain conditions, such as proper temperature and moisture, in order to germinate.	22	o Observe areas where seedlings are growing and explain some factors which may have influenced this growth.
Compounds of nitrogen, phosphorus, and potassium as well as small amounts of many other elements are essential to plant growth and reproduction. (TA) Fertilizers are used extensively to improve crop yields.	24	o Test soil to determine its contents. o Discuss the pros and cons of fertilizers used on crops.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
When dead plant material, dead animal material, and waste products fall to the ground, minerals essential for plant growth are returned to the soil. (TA) Partially decomposed plant and animal material in organic fertilizers such as compost improves the growth of plants.	24	o Sift through soil to locate organic material. o Learn how to make and use compost.
Biological Science -- Protists		
Included among the protists, living things that are not easily classified as plants or animals, are protozoa, bacteria, fungi, and algae.	26	o Learn to identify fungi and lichens found on study trails. o Observe algae and protozoans under a microscope; describe some of their adaptations.
Fungi are simple plant-like organisms that live off plants, animals, waste products, or rotting material; e.g., molds, mushrooms, or yeast.	26	o Locate various forms of fungi (on the ground, in the soil, on live and dead trees). o Discuss the importance of fungi.
Algae are simple plant-like organisms that live in water. Some are very tiny, while others, like seaweed, grow quite large. They produce their own food and give off oxygen.	26	o Collect algae samples and observe them under a microscope, stereoscope, and/or bioscope.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Biological Science -- Animals		
Scientists' classifications of animals are based on similarities in body structures.	30	o Discuss how animals are categorized. o Identify and differentiate the physical characteristics of several animals. o Observe and describe animals seen on study trails and classify them based on body structures.
Scientists classify animals into two major groups, those that have backbones (e.g., fish, snakes, frogs, birds, and mammals) and those that do not have backbones (e.g., worms, snails, insects, crabs, jellyfish, and starfish).	29	o Observe on study trails and in the nature museum representatives from two major groups of animals. o Classify each animal seen into the appropriate group.
Animals have adaptations that enable them to obtain and conserve food, oxygen, and water; excrete waste products; move; protect themselves against predators, minimize effects of extreme temperatures; reproduce; and so forth.	29	o Observe and identify the adaptations of animals and describe the importance of adaptations to the animals. o Distinguish between physical and behavioral adaptations. o Demonstrate through illustrations, descriptions or actions the relationships between organisms' adaptations and their environment.
Animals obtain their energy from food in the form of plants, other animals, and protists.	30	o Observe animals eating or locate evidences (such as missing pieces of plants, scats, owl pellets, or bones) which indicate that animals have eaten plants and/or other animals.
Animals give off carbon dioxide, water, and other waste products.	29	o Study and interpret the water cycle. o Identify and describe the processes of respiration and prespiration. o Discuss the recycling process of animal waste products and their importance to the ecosystem.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Cold-blooded animals have body temperatures that vary somewhat with the surrounding temperatures.	29	o Observe cold-blooded animals on study trails (such as a lizard basking in the sun) and discuss the reasons for some of their behaviors. o Touch a nonpoisonous reptile or amphibian and describe the temperature of its skin.
Warm-blooded animals have adaptations that enable them to control their body temperature within a narrow range.	29	o Observe warm-blooded animals and some of their adaptations (e.g., fur, feathers, hibernation) which enable them to control their body temperature within a narrow range. o Measure and compare people's body temperatures at different times of the day.
Proper care of pets and domestic animals and behaviors affecting the welfare of wildlife involve personal responsibility and social policy.	30	o Carefully handle certain animals approved by the outdoor school staff members. o Participate in a discussion on personal responsibilities for pets and wildlife. o Study ecosystems without injuring or harrassing wildlife.
Biological Science - Ecosystems		
All the individuals of one species that live in a limited area are called a population. Populations can be counted, and their size can be estimated using sampling techniques.	39	o Observe populations of animals and plants. o Estimate numbers of certain organisms. o Recognize dominant plant and animal populations in various communities.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Population sizes often vary in cycles related to seasons, reproductive patterns, etc. Population sizes are subject to limitations imposed by space, food supply, predators, and the destruction of habitats by natural disasters or human activity. Populations sometimes die out. When all the populations of a species die out, it becomes extinct.	39	o Identify and observe some factors which limit population size. o Participate in an activity from Project WILD, "Oh Deer," to experience limiting factors and fluctuations in population. o Discuss reasons why populations become endangered or extinct. o Brainstorm ways endangered species could be saved.
The effect on other populations should be considered along with other costs and benefits when human activities that affect the environment are evaluated.	39	o Observe, identify, and evaluate positive and negative human impacts on various environments. o Analyze negative influences and discuss ways humans could minimize their impacts on the environment.
Each species needs a particular physical environment.	39	o Identify and list things all animals need to survive. o Investigate environments needed by specific animals and find evidences of the components they need for survival.
All living things that share a particular environment are called a community.	39	o Locate and identify communities found in the area.
An ecosystem consists of a community of living things interacting with one another and with the physical environment. Major types of ecosystems include aquatic (pond, creek, ocean, or estuary) and terrestrial (grassland, chaparral, forest, or desert).	39	o Differentiate between a community and an ecosystem by pointing out the differences. o Explore a variety of ecosystems and describe the characteristics of each.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Most ecosystems derive their energy from the sun through photosynthesis in green plants (producers). Animals and some plants (consumers) derive their energy from plants and/or other animals. Decomposers (usually micro-organisms like bacteria and fungi) get their energy from dead plant and animal matter and animal waste products, breaking them down into simple substances such as carbon dioxide, methane, ammonia, water, and mineral salts.	39	o Locate and identify the producers and decomposers of each ecosystem. o Discover evidences of consumers. o Explain the interrelationships between producers, consumers, and decomposers.
Food Chains and food webs indicate eating patterns of the members of an ecosystem. Predators are animals (and a few plants) that kill and eat other animals (prey). Scavengers are animals that eat dead plant and animal tissue. Parasites are animals or plants that feed off other animals or plants called hosts.	40	o Identify food chains and webs in various ecosystems. o Discuss the importance of each organism in a food web. o Classify animals seen into: predators, prey, scavengers, producers, herbivores, carnivores, omnivores, consumers, decomposers. o Find parasitic plants and/or animals. o Construct food web diagrams. o Participate in a food web game.
Two kinds of organisms sometimes have a permanent relationship called symbiosis that benefits one or both. In some such relationships, both benefit (mutualism); in others, one benefits and the other is unaffected (commensalism); and in still others, one benefits and one is harmed (parasitism).	40	o Recognize and describe at least one symbiotic relationship.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Succession is a process in which some ecosystems change over time. As changes occur in the physical features of the system, new species move in, population sizes change, etc.	41	o Locate evidences of succession in nature (find lichens on bare rocks, moss in rock crevices, and annuals in soil pockets on rocks). o Observe a pond, marsh and/or forest; infer and describe what the area looked like in the past and what it might look like in the future.
Because of the intricate relationships that exist among the living things and because of the abiotic features of an ecosystem, a change to one part of the system may have far-reaching consequences to the system that are difficult to predict or control.	42	o Predict how the absence of one natural resource would offset others. o Explain how a change in one animal or plant population can influence the population of other plants and animals in the area. o Distinguish natural change and changes caused by people. o Relate consequences of: seasonal change, erosion, plant succession, decomposition, and geologic history. o Infer people's past and present effect on the environment.
The human species poses special problems for ecosystems because of the recent rapid increase in human population; depletion of resources; widespread use of technology to alter the environment; widespread manipulation of populations of other species; and pollution of air, water, and land.	42	o Discuss impacts on ecosystems created by humans. o Brainstorm ways to minimize negative impacts on the environment. o Make commitments to participate in some environmental projects at school, at home, and/or in the community.
Earth Science - Astronomy		
Patterns of stars in the sky are called constellations. Each season has a different set of constellations that can be seen during the evening.	43	o Identify and observe constellations in the night sky using binoculars, a telescope, and/or the naked eye.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Light from stars provides information about their temperature, size, age, composition, and distance. Stars can be classified according to those characteristics.	45	o Observe stars using a telescope. o Discuss how stars are classified.
Day and night and the apparent daily motion of the sun, moon, and stars across the sky result from the earth's rotating on its axis approximately once each 24 hours.	43	o Discuss the earth's daily motion. o Compare and contrast the environment between night and day in terms of sounds, temperature changes, and types of animals present.
Moonlight is reflected sunlight. The same side of the moon always faces the earth. As the moon and earth change relative positions in their orbits, we see the part of that side that is sunlit.	43	o Observe, identify, and describe the phases of the moon.
Planets are objects that appear to the naked eye like stars but reflect sunlight and do not stay in the same place in the sky relative to the stars; stars are objects like the sun, but they are much farther away.	44	o Observe planets through a telescope, binoculars, and/or the naked eye. o Locate and identify at least one planet.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Meteroids are chunks of matter revolving about the sun; most are probably fragments of comets or asteroids, ranging in size from tiny specks to many tons. Those which enter the earth's atmosphere are called meteors; most burn up before they strike the earth. Fragments that reach the earth's surface are called meteorites.	44	o Observe "shooting stars" (meteors).
The earth's axis is tilted (23 1/2°) from being perpendicular to the plane of its orbit about the sun. Summer occurs in the northern or southern hemisphere when this part of the earth is tilted toward the sun, resulting in longer daylight hours and in a more nearly perpendicular incidence of the sun's rays. Winter occurs when the hemisphere is tilted away from the sun, resulting in shorter daylight hours and in a lower angle of incidence of the sun's rays.	45	o Use senses to learn seasonal characteristics of the environment at the outdoor school. o Discuss the seasonal characteristics evident at the time. o Dress appropriately for the weather. o Describe what affects seasonal changes.
The sun is part of a galaxy called the Milky Way, made up of hundreds of billions of stars. Telescopes make it possible to see that there are millions of galaxies.	45	o Observe the Milky Way in the night sky. o Use a telescope to see other galaxies.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Earth Science - Geology and Natural Resources		
Rocks are classified according to characteristics peculiar to the process by which they are formed; igneous, sedimentary, and metamorphic.	48	o Classify rocks based on characteristics described by a staff member and by using senses.
Rocks are broken into smaller pieces by physical, chemical, and biological weathering processes. Major agents of erosion are running water, glaciers, and wind.	48	o Locate and describe examples of rock decomposition due to physical, chemical, and biological weathering processes.
Soils are formed from particles of rock mixed with dead plant and animal matter.	48	o Use hand lenses to observe, describe, and compare soil samples. o Discuss how soil is formed.
Formation of soils is affected by climate, topography, living things, rock composition, and time.	48	o Investigate an area to determine the factors which contributed to the soil composition.
Earthquakes occur when blocks of the earth's crust under strain suddenly slip past each other along fault lines.	49	o Look for evidences of fault lines. o Discuss how earthquakes form. o Generalize where earthquakes are most likely to occur.
Geologic processes occur over millions of years as rocks rise from beneath the earth's crust, are weathered into small particles which are deposited as sediment, are buried and metamorphosed, and are eventually returned to the earth's interior. The histories of landscapes can be inferred from these processes.	49	o Observe, identify, and describe land formations.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
The geologic time scale is used to place geologic events in a time sequence.	50	o Look for evidences of geological events. o Construct a geologic time scale model of the area.
Major natural resources needed by humans include air, water, soil, minerals, plants, animals, sources of energy, and areas of natural beauty. Natural resources are in limited supply.	49	o Identify natural resources found at the outdoor school site. o Describe the importance of each resource. o Discuss how people's lives are linked to the earth's finite natural resources.
Energy is required to convert matter from a less useful into a more useful form for human needs; e.g., ore into metal, sea water into fresh water, and carbon dioxide and water into plant tissue. Renewable resources are those for which this conversion comes about naturally in relative short cycles, using the sun's energy; e.g., carbon, nitrogen, and water cycles.	50	o Locate and identify renewable resources on the outdoor school site.
Nonrenewable resources are produced in much longer cycles (e.g., rock or fossil fuel cycles) and thus tend to be consumed faster than they are replenished.	50	o Describe and evaluate nonrenewable resources and propose alternatives and/or limits to their use.
Conservation of resources and management of renewable resources are ethical concerns involving individual behavior and public policy.	50	o Analyze reasons for using natural resources wisely. o Brainstorm ways people can conserve resources. o Learn to conserve resources at the outdoor school (e.g., limit use of water and electricity; limit food waste; recycle aluminum; etc).

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Earth Science - Meteorology		
Air pressure is greatest at the earth's surface and decreases regularly with altitude.	54	o Design and/or use a barometer to measure air pressure. o Describe how a barometer operates.
Air heated by contact with the sun-warmed earth becomes lighter and is pushed upward by cooler air.	54	o Use a regular thermometer or a maximum/minimum thermometer to locate warm and cool air currents.
Winds result from differences in air pressure, which are caused mainly by uneven heating of air masses.	54	o Measure and compare the surface temperature of a body of water and/or various land surfaces. o Discuss how temperature differences cause air currents. o Observe soaring vultures (or hawks) and explain how they use updrafts (wind patterns).
Surface features affect the wind direction.	54	o Identify local surface features which are likely to affect wind direction.
Wind speed and direction can be measured.	54	o Use an anemometer to measure wind speed. o Use a Beaufort Wind Scale to estimate the wind speed. o Use a wind vane to determine wind direction.
Humidity is a measure of the amount of water vapor in the air.	54	o Construct and/or use a hygrometer (humidity indicator). o Explain how a hygrometer operates.
Dew and frost occur when water vapor condenses as air touches cold surfaces.	54	o Observe and describe the circumstances under which dew and frost form.
Clouds and fog form when moist air is chilled and water vapor condenses.	55	o Observe and describe the conditions under which clouds and fog form.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Air with water vapor cools as it rises. When water vapor cools below a certain temperature (dew point), it condenses into clouds of tiny droplets or into ice crystals.	55	o Describe what causes the formation of clouds.
When enough water accumulates in clouds, rain or snow falls.	55	o Observe and describe cloud conditions when rain or snow is falling. o Read thermometers to determine the temperature required for snowfall.
The relative humidity is the ratio of the amount of water vapor in a given mass of air to the maximum amount it could contain at that temperature.	55	o Determine relative humidity and dew point by using instruments such as a hygrometer and wet/dry bulb thermometer to gather data and analyze the data using a ratio table.
Weather is the temporary condition of the temperature, wind, and moisture of the atmosphere at a given place and time.	56	o Use standard meteorology instruments such as a maximum-minimum thermometer, anemometer, rain gauge, and/or barometer on a daily basis to predict weather patterns.
Many human activities, as well as natural phenomena such as fires, volcanoes, and dust storms, pollute the air with gases, particles, and droplets of liquids (aerosols).	56	o Identify human activities as well as natural phenomena which pollute the air. o Perform an experiment by placing petri dishes covered with petroleum jelly in various places to trap polluting particles; examine and analyze the dishes to determine the extent of air pollution in the area.
All human activities that pollute the air are of concern to individuals and society.	56	o Brainstorm problems that pollution is causing. o Suggest how to limit and clean up air pollution.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Earth Science - Oceanography		
Water is essential to all forms of life.	57	o Discuss the importance of water. o Investigate the watershed of the outdoor school site. o Identify sources of water for plants and animals in each ecosystem.
The earth's water moves constantly through the water cycle. Water evaporates from the oceans, condenses into clouds, falls to earth as rain or snow, collects in lakes and underground in porous rocks, and eventually reaches the ocean again.	57	o Observe and describe parts of the water cycle. o Illustrate the water cycle and/or participate in a water cycle game.
Energy from the sun drives the water cycle by causing evaporation.	58	o Identify the sun as the energy which moves the water cycle. o Infer consequences which could happen if the sun disappeared.
Pollutants carried into oceans and lakes affect living things and need to be controlled by individual behavior and public policy.	58	o Look for evidences of pollution. o Perform various water pollution experiments. o Discuss consequences of polluted water. o Brainstorm ways to keep water clean and to clear up existing polluted water.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Physical Science - Energy: Sources and Transformations		
Sources of useful energy include sunlight, earth's heat (geothermal), wind, water flow, nuclear reactors, and fossil fuels. The energy stored in fossil fuels came originally from the sun.	72	o Describe energy sources. o Categorize energy sources according to renewable and nonrenewable resources. o Identify the energy sources used at the outdoor school and in homes.
Care and conservation in the use of energy and in the choice of energy sources involve personal behaviors as well as public policy.	73	o Participate in conservation practices at the outdoor school. o Transfer conservation practices learned to the home and school environment.
Physical Science - Energy: Sound		
Noise pollution resulting from technological applications needs to be controlled by individuals and by society.	89	o Compare the relative silence of the outdoor school site to background level noise in typical urban and suburban environments.

Science Components	Page # In Addendum	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Science - Ethical Issues		
The classroom (outdoor school) climate is one of honesty and mutual trust.	91	o The resident outdoor school staff encourages a climate of honesty and mutual trust by providing positive role models and experiences to develop in students caring and respect for one another and the natural world.
Individual and minority viewpoints are considered.	91	o Trail teaching and the residential setting encourages small group discussions and the sharing of information and provides opportunities to develop respect for differing opinions of peers.
Open-ended questions are used.	91	o On study trails, outdoor school staff use open-ended questions to stimulate serious thought and small group discussions on various environmental themes, concepts, ideas, and issues.
Learners are provided opportunities to practice ethical development on various non-threatening issues.	91	o Students are encouraged to participate in group discussions on environmental issues. They learn to develop appropriate attitudes and behaviors regarding conservation of our natural resources.
Learners are encouraged to make responses to and share thoughts with one another.	91	o The residential setting of the outdoor school and the small group interaction in cabins and/or on study trails promote cooperation among all students and appreciation for the uniqueness of others. Everyone is encouraged to state and discuss his/her views on environmental and social topics.

HISTORY - SOCIAL SCIENCE FRAMEWORK COMPONENTS AND CURRICULUM APPLICATIONS TO RESIDENT OUTDOOR SCHOOLS

All three goals specified in the California State Department of Education's History-Social Science Framework (1988) have been identified as important in a residential outdoor education program. These include: 1) knowledge and cultural understanding; 2) democratic understanding and civic values; and 3) skills attainment and social participation. These goals are achieved at the resident outdoor school in many ways. Students study the area's history by discovering artifacts or other evidences which provide a vivid historical perspective of the people who once lived there. In addition, living, learning, playing, working, and studying together provides students with a feeling of ease to interact with other individuals including those from different cultures, races, and backgrounds. Students participate in a democratic residential setting and are provided with a wide variety of social living experiences. As members of cabin groups, they learn how to live with others, plan activities, share thoughts and feelings, and maintain a clean cabin. As members of activity groups (special interest activities, dancing, dramatics), students learn social graces and cooperation. As members of a study trail group, students work together, share observations, and participate in many discussions. Students learn the skills of communication, cooperation, consideration, and compromising. They also accept their individual share of work, further demonstrating social responsibility.

History/Social Science Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Knowledge and Cultural Understanding		
Historical Literacy		
Develop a keen sense of historical empathy.	12	o Observe artifacts or remnants of past residents (e.g., mortars, arrowheads, log cabins, old mines). o Study the history of the area.

History/Social Science Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Analyze cause and effect.	13	o Analyze cause and effect by observing the results on the environment by various land uses such as mining operations, forest harvesting, farming, ranching, and residential development.
Understand the reasons for continuity and change.	13	o Discuss and evaluate changes which have taken place in the area in the past 100 years.
Understand the importance of religion, philosophy, and other major belief systems in history.	13	o Determine how religion, philosophy, and beliefs of past residents have affected the area.
Ethical Literacy		
Recognize the sanctity of life and the dignity of the individual.	14	o Participate in a variety of activities with opportunities for positive social interaction with staff, teachers, and peers to gain respect for each person as a unique individual.
Cultural Literacy		
Understand the rich, complex nature of a given culture.	14	o Study the culture of the Native American people who once lived in the area.
Learn about the mythology, legends, values, and beliefs of a people.	15	o Listen to Native American legends. o Observe constellations in the sky and learn their associated myths and legends.

History/Social Science Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Recognize that literature and art reflect the inner life of a people.	15	o Observe, describe, and discuss how Native American art reflects the Native American culture. o Learn Native American art forms and techniques such as basket weaving, pottery making and/or painting of symbols.
Develop a multicultural perspective that respects the dignity and worth of all people.	15	o Participate in ongoing problem-solving to promote positive group living with students from multicultural groups.
Geographic Literacy		
Develop an awareness of place.	12	o Compare, using senses and scientific equipment, the physical characteristics of the place where the outdoor school is located including its land forms, water bodies, soils, weather, natural vegetation, and animal life.
Develop locational skills and understanding.	16	o Use map reading skills to: determine direction on the earth's surface; measure distances between places; interpret information available through the map's legend. o Determine direction using: a compass; sun movements; constellation observation; or plant growth.
Understand human and environmental interaction.	16	o Compare human and environmental interaction at the outdoor school to the human and environmental interaction in cities and other communities. o Evaluate positive and negative effects of human actions in specific areas. o Explore different views of and solutions for current environmental issues and problems. o Analyze and discuss how human decisions affect the environment.

History/Social Science Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Democratic Understanding and Civic Values		
National Identify		
Realize that true patriotism celebrates the moral force of the American idea as a nation that unites as one people the descendants of many cultures, races, religions, and ethnic groups.	21	o Live, learn, play, work, and study with students from other classes, schools, cultures, races, and backgrounds.
Constitutional Heritage		
Understand the basic principles of democracy.	21	o Experience social living which implements the democratic process.
Civil Values, Rights, and Responsibilities		
Understand what is required of citizens in a democracy.	22	o Participate in group living situations which emphasize cooperation, consideration, courtesy, and responsibility.
Understand individual responsibility for the democratic system.	23	o Learn, through experience and by observing adult role models, the kinds of behaviors which are necessary for the functioning of a democratic society. o Practice sportsmanship, fair play, sharing, and taking turns. o Respect the rights of all, including the minority.

History/Social Science Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Skills Attainment and Social Participation		
Participation Skills Develop personal skills.	24	o Develop sensitivity to the needs, problems, and aspirations of others through small group interaction or work and play. o Express personal convictions and listen to the convictions of peers from other cultures or ethnic groups during discussions on study trails, in cabin groups, or during meals or recreational activities. o Become responsible for one's behavior by following rules and practicing consideration and cooperation.
Develop group interaction skills.	24	o Recognize that individual action affects the group. o Cultivate friendship with students from other classes and schools; and with staff members and other adults. o Participate in decision-making, goal setting, and rule establishing for group life. o Plan, organize, and implement group skits, chores, and recreational activities. o Learn and practice human relations skills such as persuading, debating, negotiating, and resolving conflict in socially acceptable ways. o Develop respect for differing opinions of peers through participation in small group discussions, problem-solving, and decision-making. o Practice leadership skills as well as the willingness to follow other leaders during cabin meetings, recreation activities, and on study trails.

History/Social Science Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Develop social and political participation skills.	24	o Discuss ways to minimize negative environmental impacts. o Practice sound conservation procedures such as conserving electrical energy and water; picking up litter; recycling; staying on trails to prevent erosion. o Make commitments to use natural resources wisely at home, at school, and in the community. o Accept responsibility for one's actions. o Participate in a variety of success-oriented activities with other students to develop an awareness of individual worth as well as dependence and interdependence.
Critical Thinking Skills		
Define and clarify problems.	25	o Define, clarify, and evaluate problems through observation, discussion, and further research.
Solve problems and draw conclusions.	25	o Participate in small group discussions concerning environmental issues; identify reasonable alternatives for solutions to the problems. o Analyze data gathered on study trails and draw conclusions. o Predict probable consequences of an event such as development of an area, pollution of a body of water, or erosion.

History/Social Science Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Basic Skills		
Obtaining information and judging its value.	26	o Learn to distinguish the difference among fact, opinion, and reasoned judgment by actively participating in hands-on data gathering and by working and getting to know people from various cultures first hand. o Obtain information through observation and evaluation on study trails, research in the outdoor school library and/or museum, and discussion in small groups.
Reaching reasoned conclusions based on evidence.	26	o Use the scientific method to reach conclusions. o Observe and interpret structures and patterns in nature (cycles, etc). o Explain and predict how a change in one animal population influences the population of other plant and animal populations in the area. o Describe reasons for certain animal and plant adaptations.
Develop sound judgment.	26	o Practice group living which emphasizes cooperation, consideration, courtesy, and responsibility to help develop sound judgment. o Observe positive adult role models. o Make decisions on how to use "free" and recreation time.
Discuss and debate.	26	o Discuss and debate in small groups differing views on environmental issues; reasons for various plant and animal adaptations; how to solve group living problems, etc.

History/Social Science Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Acquire information by listening, observing, reading, and using community resources.	26	o Become directly involved in the learning process by participating in hands-on, multi-sensory experiences in the out-of-doors. o Gather data by observing and investigating various ecosystems. o Obtain verbal information from a staff member. o Use resource materials such as field guides, classification keys, and collections. o Listen to speakers from the community or nearby state or national parks who may share their knowledge at special evening programs.
Read and interpret maps.	26	o Use a map to locate geological features, to find the location of the resident outdoor school, or to determine the size of, or distance to, a specific area. o Participate in orienteering exercises.
Organize and express ideas clearly in writing and in speaking.	26	o Participate in group discussions on study trails and in cabins with counselors and other staff members. o Write in journals: record observations, perceptions, and personal feelings about nature. o Write poems, stories, songs, and/or essays.

PHYSICAL EDUCATION FRAMEWORK COMPONENTS AND CURRICULUM APPLICATIONS TO RESIDENT OUTDOOR SCHOOLS

The California State Department of Education's Physical Education Framework (1973) specifies that "physical education is an integral part of education which contributes to the development of the individual through planned movement or physical activity or exercise" (p. 3). Sections of the five major physical education goals described in the Physical Education Framework have been identified as important in a residential outdoor education program. These include the development of motor skills; physical fitness; self-image; social behavior; and recreational interests. The resident outdoor school provides many opportunities for students to participate in a wide variety of activities which promote all of these goals.

Physical Education Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Motor Skills		
To improve gross and fine motor coordination.	21	o Walk various trails. o Take part in group activities including recreational games such as "New Games."
Physical Fitness		
To develop physical fitness	38	o Hike on trails. o Participate in dancing and/or other recreational activities.

Physical Education Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Self-Image		
To develop a positive self-image.	38	o Partake in success-oriented, non-competitive activities with many opportunities for individual attention, recognition, and positive reinforcement.
To plan creatively their own activities within their capabilities.	20	o Explore interests and abilities through personal selection of available experiences (free choice activities).
Social Behavior		
To develop socially desirable behavior involving movement in interactions with others.	38	o Improve social relationships through learning to play by the rules in a friendly and responsible manner. o Join in activities that develop desirable behavior such as polite table manners. o Learn social etiquette during dancing and campfire.
To develop a group feeling in competitive activities, with an emphasis on performing common tasks rather than on winning.	21	o Participate in contests for: cleanest and/or most quiet cabin, most well mannered table during meals, most prompt group, etc. o Experience group dynamics by playing a variety of games and participating in other activities during recreation time.
To express opinions courteously, solve problems and develop respect for others.	20	o Practice politeness, share responsibilities, help solve problems which may arise, and establish a supportive caring environment with cabin mates.
To develop leadership and self-direction.	20	o Choose and direct a recreational activity. o Share and/or teach an activity, a game, or a skill.

Physical Education Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Recreational Interests		
To develop interest and proficiency in using the skills essential for successful participation in worthwhile physical recreation activities.	38	o Apply science learning to future hobbies or interests (bird watching, camping, hiking, etc.). o Learn worthy use of leisure time. o Practice skills necessary for participation in various recreational activities.

VISUAL AND PERFORMING ARTS FRAMEWORK COMPONENTS AND CURRICULUM APPLICATIONS TO RESIDENT OUTDOOR SCHOOLS

The California State Department of Education's Visual and Performing Arts Framework (1982) specifies that "the purpose of providing programs in the visual and performing arts is to produce aesthetically responsive citizens with life-long interest and involvement in the arts" (p. 6). Three goals identified in this framework are directly applicable to activities offered at the resident outdoor school. These goals include: student enjoyment of aesthetic expression and the feeling of comfort in participating in all arts; developing respect for one's creative expression and the expression of others, and experiencing aesthetic qualities in the environment. The unique natural environment of outdoor schools provides students with a variety of aesthetic experiences and opportunities for creative expression.

Sections of the four major content areas described in the Visual and Performing Arts Framework have been identified as important in a residential outdoor education program. These include components in: dance, drama/theatre, music, and visual arts. Students at an outdoor school often participate in folk or square dancing, skits, campfire songs, and nature crafts.

Visual and Performing Arts Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Goals of Visual and Performing Arts		
To develop a capacity to enjoy aesthetic expression in diverse forms and to feel comfortable participating in all of the arts.	6	o Participate in: arts and crafts activities; skits, storytelling, and songs during campfire; and dances.
To develop respect for originality in one's own creative expression and sensitivity and responsiveness to the expression of others.	6	o Create art projects out of natural objects found in nature. o Cooperate with cabin members to produce a campfire skit. o Sing songs; make up verses. o Politely listen to and watch performances by other groups.

Visual and Performing Arts Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
To develop the capacity to experience aesthetic qualities in the environment.	7	o Enjoy the natural environment at the outdoor schools. o Appreciate plants, animals, and the nonliving things in nature. o Observe a sunset, sunrise, constellations, forest, meadow, stream, etc.
Dance		
To develop the student's knowledge and appreciation of our multicultural dance heritage.	13	o Participate in folk, square, and/or other forms of dancing.
To develop a sense of involvement, the capacity to enjoy aesthetic expression in dance, and to establish positive attitudes toward self, others, and one's environment.	14	o Learn cooperation and social graces through traditional and modern folk dances and/or other types of dances.
Drama/Theatre		
To develop skills in storytelling, playmaking, and playwriting.	40	o Plan and dramatize environmental issues and/or themes. o Tell stories during campfire programs.
Music		
To develop listening skills.	69	o Listen carefully to learn songs.
To develop musical responsiveness, involvement and discrimination.	69	o Take part in all aspects of singing. o Listen to "mood recordings" during rest time, bed time, meals, etc. o Learn various parts of songs. o Sing rounds. o Use hand signals and other body language to strengthen concepts and "visualize" what is being sung. o Make and play "primitive" musical instruments.

Visual and Performing Arts Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
To develop performance skills, which include singing.	70	o Sing many songs during campfire programs. o Lead and/or perform songs in front of a group.
To understand that music is a part of living and is related to historical and social movement; people use music to communicate and to express feelings, to lighten labors, to tell about their world, and to satisfy emotional needs.	72	o Sing a wide variety of songs. Learn the origins and meanings of some songs and discuss why people like to sing. o Sing or hum when performing chores or when doing other work.
Visual Arts		
Develop manipulative and organizational skills in using visual arts media effectively to translate ideas, feelings, and values.	94	o Participate in various arts and crafts using items and/or inspirations from nature. For example: Create a miniature replica of a forest. Sculpture items out of wood, clay, or rock. Build a texture board. Weave from natural objects. Design a nature mosaic or collage. Sketch, draw, paint, or color a natural scene.

ENGLISH-LANGUAGE ARTS FRAMEWORK COMPONENTS AND CURRICULUM

APPLICATIONS TO RESIDENT OUTDOOR SCHOOLS

The California State Department of Education's English-Language Arts Framework (1987) specifies that "the English-language arts curriculum must provide students, through their study and understanding of literature, and their experiences in listening, speaking, reading, and writing, with a level of literacy and fluency that enables them to become informed and responsible citizens, competent and successful members of the work force, and thinking, fulfilled individuals within our society" (p. 4). At the resident outdoor school, students are provided with a variety of experiences in listening, speaking, reading, and writing. The residential setting allows students to participate in democratic living and cultivate work habits necessary for the welfare of the outdoor school community. In addition, students gain a feeling of self-dependence and growth by mastering new skills.

Several components specified in the English-Language Arts Framework have been identified as important in a residential outdoor education program. These include: integrating instruction in the language arts; using recreational-motivational reading; helping students develop composition skills; and developing oral language skills. Small groups on study trails allow students opportunities to listen to one another and discuss observations and relevant issues. Students are encouraged to write in their journals, as well as letters to parents and friends. Quiet time offers a chance for students to read and/or write.

English-Language Arts Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Goals of the English-Language Arts Curriculum		
To prepare all students to function as informed and effective citizens in our democratic society.	1	o Participate in a residential social living experience which implements the democratic process. o Practice communication skills in small groups; discuss thoughts, feelings, ideas, concepts, and issues.

English-Language Arts Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
To prepare all students to function effectively in the world of work.	2	o Cultivate work habits connected with daily living. o Partake in various work experiences such as cleaning cabins, washing dishes, picking up litter, constructing weather stations, conducting campus improvements, building bird feeders, etc. o Appreciate the physical satisfaction and dignity of working.
To prepare all students to realize personal fulfillment.	2	o Gain a feeling of self-sufficiency and growth by mastering new skills and learning to take care of personal basic needs.
Integrating Instruction in the Language Arts		
Students use of language must be both motivated and integrated.	6	o Participate in direct experiences with a variety of subject matter such as life science, geography, and history to facilitate integration and motivation in the use of language.
Using Recreational-Motivational Reading		
Curriculum provides...recreational motivational reading that is based on students' natural curiosity and that encourages them to read for pleasure.	7	o Bring reading material from home to read during "quiet time." o Read books, stories, and magazine articles to further explore new interests acquired at the outdoor schools.

English-Language Arts Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Helping Students Develop Composition Skills		
Daily experiences with journals or writing logs enable students to become fluent and confident about writing.	10	o Record in journals daily observations, perceptions, and personal feelings about nature.
To develop in students the sense that they are writers...to express a thought or an opinion, and to make their experience vivid and memorable to someone else.	11	o Describe in a journal or in letters to family and friends experiences which occurred at the outdoor school.
Offer students multiple opportunities, formal and informal, to develop their speaking and listening skills...	11	o Participate in small and large group discussions on a variety of topics.
Developing Oral Language Skills		
Informal discussions will help students learn to listen alternatively to what others are saying, to evaluate and respond, and to incorporate what they hear into their own thinking and responding.	12	o Take part in small group discussions: on study trails (after observing, measuring, and recording information); during cabin meetings; during free choice activities; and at mealtimes. o Share ideas concerning the importance of people's relationship to their natural environment and their responsibility for wise use of resources.

English-Language Arts Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Discussions between partners or in small groups will help students learn to state opinions honestly, precisely, and tactfully to discover multiple viewpoints on a difficult issue and to negotiate and find common ground.	12	o Develop respect for differing opinions of peers by problem-solving to promote positive group living experiences. o Explore different views of current environmental issues.
Effective Instruction in English-Language Arts		
Those who are involved and active in their learning of reading, speaking, writing, and listening find ideas, meaning and importance in what they are doing. The activities and learning make sense.	14	o Actively participate in all aspects of the resident outdoor school to acquire opportunities to listen, speak, read, and write. o Become directly involved in the learning process through group investigations of the natural environment. o Communicate observations, ideas, thoughts, and feelings to others. o Record experiences through creative writing. o Listen alternatively to what others are saying; evaluate and respond; state opinions tactfully; understand multiple viewpoints.
Teaching strategies allow students to take active roles in their learning, share ideas with partners and groups, ask questions about what they want to know...develop in students the skills they must take with them from school into the rest of their lives.	14	o Participate in multi-sensory experiences which encompass all styles of learning (including visual, auditory, and kinesthetic) and utilize a variety of communication modes, including use of inquiry questioning techniques, debates, group discussions, etc.

English-Language Arts Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Exemplary Practices		
Students who learn to work with one another in cooperative learning groups based on mutual interests and criteria other than ability develop their capacity to use language creatively and critically.	26	o Recognize the worth of small group interaction in: planning solutions for problems; sharing ideas; setting standards; and evaluating results of planned activities at the outdoor school.

HEALTH FRAMEWORK COMPONENTS AND CURRICULUM
APPLICATIONS TO RESIDENT OUTDOOR SCHOOLS

The California State Department of Education's Health Instruction Framework (1978) specifies that the mission of a health instruction program is to enable students to become health-educated individuals, taking responsibility for incorporating scientific knowledge into their daily health practices, assuming a responsible role in society, promoting community health and practicing conservation of human resources (p. 15). This framework lists three broad multidisciplinary goals of health instruction which are to enable students: to grow in self-awareness; to develop skills for effective decision-making; and to grow in coping action. At a resident outdoor school students have opportunities to develop a positive sense of identity and self-esteem. Activities are success-oriented to enhance students' self-concepts. Students are guided to deal positively and creatively when handling life situations during their stay at the outdoor school. They are encouraged to be open to or accept new experiences, to interact in resolving problems, and to participate fully in all social and educational aspects of the outdoor education program.

Of the ten content areas specified in the Health Instruction Framework, six have been identified as important in a residential outdoor education program. These include: personal health; family health; nutrition; mental-emotional health; accident prevention and emergency health services; and environmental health. Several components of each content area are stressed at an outdoor school to ensure the health and safety of all students and to encourage them to foster a positive human environment.

Health Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Broad Multi-Disciplinary Goals of Health Instruction		
To grow in self-awareness.	16	o Develop a positive sense of identity and self-esteem by participating in a variety of success-oriented activities.

Health Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
To develop skills for effective decision-making.	16	o Practice decision-making skills by acquiring information, analyzing data, and choosing from alternatives. o Participate in effective personal and group living (exercise, rest, nutrition, responsible behavior and attitudes) provided through guidance by positive role models.
To grow in coping action.	16	o Accept a variety of new experiences. o Practice human relations skills such as developing new friendships, resolving conflicts, being health and safety conscious, and understanding our value system. o Recognize the importance of courtesy, consideration, and cooperation.
Personal Health		
Develop personal practices related to wellness.	20	o Practice high health standards by showering, brushing teeth regularly, and taking responsibility for personal neatness. o Participate in recreational and outdoor activities that have carry-over value to healthful living all through life.
A balanced program of physical activities, rest, recreation, and adequate diet contributes to fitness and cardiovascular health.	20	o Participate in a structured, well-balanced program consisting of a variety of activities, including hikes on study trails as well as time for rest and recreation. o Eat nutritious meals prepared by qualified staff.
Adequate relaxation, rest, and sleep reduce the stress of fatigue and tension and allow some body systems to become revitalized.	22	o Observe quiet hours at rest time and bed time.

Health Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Family Health		
Engage in and promote satisfying human relationships which provide a setting in which individuals can be nurtured and grow.	26	o Participate in activities with other students to develop an awareness of individual worth as well as dependence and interdependence. o Share responsibilities. o Take advantage of opportunities for personal growth. o Meet new friends.
The capacity to adjust to, understand, and respect others will enhance one's interpersonal relationships.	26	o Help establish a supportive, caring environment with cabin mates. o Develop a list of behaviors which ensure a successful group experience including courtesy, consideration, cooperation, reliability, and appreciation for the uniqueness of others.
Nutrition		
Develop eating patterns which contribute to wellness. Daily food intake is related to the attainment of optimal health.	32	o Practice good table manners. o Follow proper nutritional habits by eating well-balanced meals provided at the resident outdoor school.
Lifestyles, peers, and individual family resources reflect similarities and differences in food choices.		o Experience a variety of foods. o Accept differences in food choices of peers.

Health Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Mental-Emotional Health		
Make decisions which contribute to building self-acceptance and reducing individual stress and anxiety.	34	o Take part in nongraded instruction and noncompetitive activities. o Use decision-making skills to select choices of special interest activities, skits to be presented at the campfire, etc.
Knowing, liking, and understanding oneself; making friends; and getting along with others are essential to mental/emotional health.	34	o Make new friends from other classes, schools, and cultures. o Help establish a supportive, caring environment with cabin mates. o Learn the importance of being a team member and practice responsibility, cooperation, and respect for others.
Understanding and coping with emotions in an acceptable way is healthy, while unresolved conflicts involving self and others cause stress and anxiety.	34	o Understand and cope with emotions in an acceptable way through the help of supportive and caring adult supervision. o Relieve stress through active play, work detail, and conservation projects.
Resolving problems through decision-making helps to reduce stress.	36	o Participate in small discussion groups to resolve problems and arrive at group decisions.
Accident Prevention and Emergency Health Services		
Develop the understanding that a safe environment and preparedness to deal with emergency situations contribute to wellness.	48	o Understand the importance of good safety practices. o Live, work, and play in a healthy, safe environment, consistent with safety standards. o Learn emergency procedures of the resident outdoor school.

Health Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Many accidents can be prevented.	48	o Follow all safety rules at the resident outdoor school site, on trails, and during recreational activities. o Learn how to hike safely.
Individuals need to be prepared to act effectively in times of emergency, including life-threatening situations.	48	o Know emergency procedures in case of fire, lost person, etc. o Participate in practice emergency drills.
Safety and first aid help reduce accidents, prevent further injury, and save lives.	48	o Observe all outdoor school safety rules. o Learn procedures to follow in case of an accident.
Environmental Health Components		
Develop the understanding that an environment in ecological balance enhances one's mental, social, and physical well-being.	54	o Study ecosystems, discuss ecological balance, and describe the interrelationships between human lifestyles and the ecological balance of other life forms. o Discuss how changes in environments can create new health hazards. o Evaluate the relationship between environmental quality and personal health.

Health Components	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Participate in activities designed to promote and foster a positive human environment.	54	o Make decisions which are based on real life situations involving the comfort, health, safety, and well-being of everyone at the outdoor school. o Practice conservation (wise use of natural resources), cooperation (working together toward a positive human environment), and consideration (respecting nature and the rights of people). o Learn how to wisely use natural resources by conserving water, energy (electricity, etc.), and food, and by recycling human-made items whenever possible. o Keep all areas litter free. o Stay on trails to prevent erosion. o Show respect for all living and nonliving things. o Participate with other students in projects such as tree plantings, erosion control, trail maintenance, building bird feeders and/or houses, etc.
Maintaining a safe and healthful environment is a shared responsibility of the individual, family, and society.	54	o Discuss how to help maintain a safe and healthful environment. Make commitments to participate in environmental projects at the outdoor school, at school, and in the community. o Take part in citizenship opportunities on an action level to maintain a safe and healthful environment.

MATHEMATICS FRAMEWORK COMPONENTS AND CURRICULUM

APPLICATIONS TO RESIDENT OUTDOOR SCHOOLS

The main goals of mathematics instruction identified in the California State Department of Education's Mathematics Framework (1985) are "to promote understanding and enjoyment of mathematics" (p. 25) and "to develop students' thinking and problem-solving skills" (pp. 1-2). At the resident outdoor school students participate in a variety of activities which encourage enjoyment of mathematics because the first-hand experiences make the subject real and meaningful. Problem-solving skills are reinforced on study trails and in cabin groups.

Two of the five major areas of emphasis specified in the Mathematics Framework have been identified as important in a residential outdoor education program. These include problem-solving, estimation, and mental arithmetic. In addition, six of the seven content areas described in this framework are often incorporated into outdoor school instructional activities. The six content areas are: number, measurement, geometry, patterns and functions, statistics and probability, and logic.

Mathematics Components and Curriculum	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Goals of Mathematics Instruction		
To promote understanding and enjoyment of mathematics	25	o Participate in a variety of first-hand experiences using mathematical skills such as measuring and calculating stream flow and/or dimensions of a pond.
To develop students' thinking and problem-solving skills.	1 & 2	o Solve challenging, real-situational problems such as calculating: average temperature, barometric pressures, or precipitation; the number of board feet required to build a house; or the number of trees necessary to produce a Sunday edition of a major newspaper.

Mathematics Components and Curriculum	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Major Areas of Emphasis in Mathematics		
Problem-Solving		
Analyze patterns and relationships... find and test solutions, and interpret results.	3	o Generalize about and analyze patterns in nature following observation exercises. o Perform experiments such as water and soil analysis. o Interpret results based on data acquired in the field.
Estimation and Mental Arithmetic		
Estimate and to do mental arithmetic.	4	o Estimate: measurements of stream flow; number of trees in a specific area; tree age, height, and diameter; number of board feet in a log; percentage of slope; time of day; temperature; etc.
Use strategies to build estimating skills.	26	
Content and Structure of the Mathematics Program		
Number		
Choose the most efficient and effective method of solving a given problem.	9	o Determine how to calculate the: surface area and volume of a pond; stream flow; size of a tree; age of a tree.
Develop the concept of ratio and proportion.	9	o Estimate the size of a tree using the triangulation and/or ratio method.

Mathematics Components and Curriculum	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Measurement		
Make informal comparisons.	9	o Compare sizes of a variety of things in nature such as trees, flowers, birds, aquatic organisms, rocks, etc. o Compare soils, slope effect, and climatic and vegetative differences in various environments.
Recognize that standard units are needed for communication and simplified computation.	9	o Use a meter stick or other measuring device to determine length of objects or distances between specific points.
Use estimation to approximate measurement.	27	o Estimate the size of a pond, lake, marsh, meadow, tree, shrub, snake, etc.
Use methods of indirect measurement... to find quantities that cannot be measured directly.	9	o Calculate the height of a tree; gallons of flow per second of a stream; number of board feet in a log; volume of a pond.
Participate in hands-on experiences which provide a basis for the concepts of measurement.	26	o Measure stream flow and width. o Determine surface area and volume of a pond. o Pace off distances. o Count the number of trees in an area. o Determine age and interpret growth rings of a tree. o Calculate the height of a tree. o Use a variety of measuring instruments in the field.
Develop skills in using measurement instruments.	27	o Correctly operate a variety of measuring instruments including weather predicting tools such as thermometers, barometers, anemometers, hygrometers, rain gauges, etc.

Mathematics Components and Curriculum	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Geometry		
Develop a knowledge of geometric figures... through many experiences with concrete materials.	9	o Observe and interpret geometric shapes in nature. o Participate in an orienteering activity.
Patterns and Functions		
Encourage the discovery of patterns; and develop ways to describe or represent them.	10	o Observe, interpret, and describe patterns in nature such as cycles (soil, water, life, food chain, etc.), tree rings, constellations, crystals, etc.
Statistics and Probability		
Collect, organize, interpret, and present data.	10, 26	o Measure, record, and present weather information. o Gather and interpret data on: water, soil, various ecosystems found in the area, geological features, and/or the history of the area.
Logic		
Recognize patterns, classify and sort objects.	11 22	o Classify patterns found in nature. o Sort and classify plants, animals, and various nonliving things (rocks, soil, stars, etc.) using senses and scientific equipment.

Mathematics Components and Curriculum	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Delivery of Instruction in Mathematics		
Reinforcement of Concepts and Skills		
Give students meaningful and creative experience that supplements the activities of the classroom.	13	o Discover how mathematics is used to: estimate populations of plants and animals; predict weather, succession, erosion, depletion of natural resources; locate geographic features; incorporate natural patterns (symmetry, shapes, colors) into art; and foretell future events and conditions based on data and experience.
Problem-Solving		
Maximize each student's experience in solving challenging real-world and abstract problems.	13	o Calculate the average temperature, barometric pressure or precipitation. o Interpret results based on data acquired using weather predicting instruments. o Calculate the number of trees needed to build a house (or provide paper for a Sunday edition of a large newspaper). o Predict the time it takes for a tree to grow a certain height.
Situational Lessons		
Situational lessons that have immediate significance for students...	15	o Determine how many people can live off a stream or an area of land located at the outdoor school.

Mathematics Components and Curriculum	Page #	Examples of Resident Outdoor School Curriculum Topics, Activities, and Processes
Use of Concrete Materials		
Students connect their understandings about real objects and their own experiences to mathematical concepts.	15	o Become involved in participatory learning by manipulating and experiencing real objects in nature.
Cooperative Learning Groups		
Students must interact with materials, express their thoughts, and discuss...explanations.	16	o Participate in small group investigations and discussions on study trails.
Questioning and Responding		
Teachers use stimulating questions to get students involved in a lesson, improve students' understanding.	17	o Learn from experienced staff members who are well trained in the use of inquiry questioning techniques and ways to get students involved in lessons through hands-on participatory learning.

CHAPTER 2

PRE-OUTDOOR SCHOOL ACTIVITIES

In this chapter, six lessons have been designed for classroom teachers to implement before their classes attend the resident outdoor school. The concepts for these lessons were based on recommendations by members of California Outdoor School Administrators (COSA). Activities were chosen and revised from a variety of outdoor school handbooks for teachers and from other environmental/outdoor education publications such as Project WILD and Project Learning Tree. References are listed in the References Section located at the end of this guide.

PURPOSE OF THE LESSONS

The purpose of the Pre-Outdoor School Activities is to provide an adequate background from a social as well as a scientific standpoint for students attending a resident outdoor school. The lessons set the stage for the outdoor school experience. Students learn ecological concepts and practice a variety of process skills. This exposure will help students during instructional activities at the outdoor school. The lessons are in the recommended order of use:

Lesson 1, Logging Your Sights and Insights
Lesson 2, Solar Power and Its Food Chains
Lesson 3, Tying It All Together
Lesson 4, The Looks Have It
Lesson 5, Creating a Positive Experience
Lesson 6, Naturally Good Manners

LESSON FORMAT

The lessons follow a format designed by the California State Department of Education's Science Unit.

The lesson format allows easy implementation by teachers. Background information for each lesson is provided. Lessons require minimal preparation. Materials recommended for activities are inexpensive and readily available. The process skills oriented activities are correlated to the State Science Framework Addendum. In addition, many lessons are integrated with other curricular areas including social science and language arts.

The lessons in this chapter contain student worksheets, homework assignments, and appropriate charts and other information for use in transparencies. A variety of extension activities are listed, many of which are from Project WILD and Project Learning Tree. Each pre-outdoor school lesson is correlated to the State Science Framework Addendum and/or the History-Social Science Framework.

CODES FOR WORKSHEETS, ASSIGNMENTS, AND TRANSPARENCIES

Student worksheets, homework assignments, and transparencies are coded on the top right-hand corner. Example: II Pre 3, TA. The Roman numeral indicates the section of the document. Pre 3 represents Pre-Outdoor School Activities, Lesson 3. TA stands for Transparency A. Codes include:

SW	Student Worksheet	(SW1 - Student Worksheet 1)
T	Transparency	(TA - Transparency A)
AT	Answers to Transparency	
HA	Homework Assignment	(HA2 - Homework Assignment 2)
SH	Student Handout	
TIS	Teacher Information Sheet	
TP	Teacher Page	

PRE-OUTDOOR SCHOOL ACTIVITIES

Lesson 1

LOGGING YOUR SIGHTS AND INSIGHTS

LESSON SUMMARY: Students develop a journal, record their observations of a tree, and describe characteristics of various leaves.

GOAL: To provide students with opportunities to practice using their senses and recording scientific observations as well as personal feelings in a journal.

GRADE LEVEL: 5-7 **DURATION:** Three one-hour periods

LEARNING OBJECTIVES:

Upon completion of this lesson, students will be able to:

1. Use a journal to record observations, impressions, and feelings and be able to distinguish among them.
2. Use senses of sight, sound, smell, and feel to explore a tree and its environment.
3. Record observations from a real tree and compare the gathered data to a tree described from memory.
4. Write a detailed description of a leaf.
5. Identify a specific leaf based on another student's written description.
6. Discuss the value of journals.

PROCESS SKILLS USED IN THIS LESSON:

1. Using senses to gather and analyze data on a specific tree.
2. Communicating orally, pictorially, and in writing.
3. Comparing trees and leaves.

BACKGROUND FOR TEACHERS:

1. Careful observation will allow us to appreciate, respect, and learn more about the world in which we live.
2. Developing our senses can promote inquiry and understanding concerning our surroundings. As a result, we may detect changes which indicate environmental problems. Being able to identify environmental problems is one prerequisite to becoming an aware and informed decision maker.
3. Looking can be different from understanding what we are seeing, depending on who we are, where we are, what we are concerned about, and why we are looking.
4. Some of the things scientists do include careful observing, comparing, communicating, measuring, and organizing information (from Science Framework Addendum).

5. Nature frequently provides opportunities for creative expression in music, art (including photography), and literature. Examples: "The Grand Canyon Suite" by Ferde Grofe, "Rocky Mountain High" by John Denver, paintings by Andrew Wyeth, photographs by Ansel Adams, and writings by Henry David Thoreau and John Muir.
6. Components of a Journal could include the following:
   a. Drawings to express feelings, show detail in observations (of plants, animals, nonliving things, etc.), illustrate ecological concepts, and model classification systems.
   b. Scientific writing through data collection, recording, and interpretation.
   c. Experiences in language arts through writing observations, impressions and feelings; composing poetry about things seen and felt; and reading about the environment.
7. In addition to recording impressions, feelings, and observations, a journal can become a log of important data to be referred to at a later time. It can reflect changes in ecosystems, including dominant plant species, sizes of animal populations, etc.
8. Students should be aware of the difference between descriptive scientific writing and the writing of personal reactions or impressions. Both styles should be encouraged. When students are gathering scientific data, they should be as objective as possible using careful, precise, and descriptive writing (e.g.: not "large" but "1.5 meters long"; not "cold" but "10^{o}c"). When students are recording personal reactions or impressions, their thoughts and feelings should be the focus (e.g., "the snake seemed large to me but I wasn't afraid," or "it felt cold to the touch") of their writing.

PREPARATION FOR LESSON:

Materials for Students:

Student Worksheet, "Looking Closer, Seeing Better" (Pre 1, SW)
Clipboards or cardboard to write on
Two sheets of construction paper per student (12" x 18")
5-10 sheets of notebook paper (lined and unlined) per student
Pencils, regular and colored
Crayons
Stapler
30 leaves from at least 3 different species of plants. Optional: use some leaves from the fragrant California bay laurel.

Materials for Teacher:

Bulletin board or wall display of any kind
Sheet or towel

Management Suggestions:

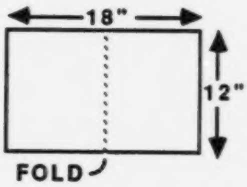
1. Discuss appropriate behavior for the outdoor assignment:
   - o Same rules apply as indoor assignments.
   - o Stay within designated boundaries.
   - o Return when specific signal is given.
2. Set a time limit.
3. Bring a few extra pencils and/or a pencil sharpener.

INSTRUCTIONAL STRATEGY:

1. a. Cover a bulletin board or other wall display (or a table with various articles on it) with a sheet or towel before students come to class.
   b. Instruct students to write down all the items they remember being there. They should include the type of objects or pictures and descriptions such as colors, sizes, etc.
   c. Ask students to share their lists with the class. Record this information on the board.
   d. Uncover the display for ten seconds. Have students add at least five more items to their lists. Write down their additional observations on the board.
   e. Uncover the display for the final time and ask students to add five new observations to their lists.
   f. Discuss which types of things were most often remembered, which were missed and the reasons for this. Ask, "What is the difference between looking and seeing?"
2. a. Tell students that they will be designing journals to record their observations and feelings about nature. Items in the journal should be nature or science oriented.
   b. Distribute paper and staplers and instruct students to do the following:

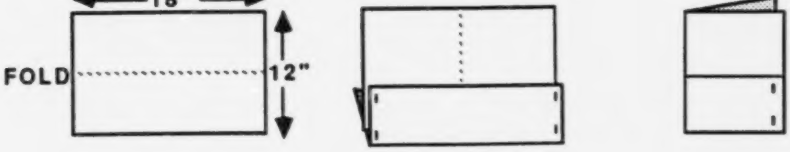
      1) Fold one 12" x 18" sheet of paper in half, crosswise, to make a 9" x 12" folder. (See Illustration A.) This will be the cover of the journal.

Illustration A



      2) Fold the other 12" x 18" sheet of paper lengthwise to make a 6" x 18" folded sheet. Place the opened cover inside the lengthwise piece of paper and staple near the ends. (See Illustration B.) This will form a pocket on the front, middle, and back to hold papers.

Illustration B



3) Add 5-10 sheets of notebook paper (some with lines to write on and some without lines to draw on). Staple these to the inside of the folder.
4) Label the cover, "Nature Journal" or "Scientific Notebook," add your name, and decorate it with nature drawings.

3. a. On an unlined page of the journal, ask students to draw a tree from memory. Allow 5-10 minutes. Then have them list characteristics (or descriptions) of their tree.
   b. Discuss and list the characteristics on the board and save these for future comparison.
   c. Distribute Student Worksheet, "Looking Closer, Seeing Better," clipboards, and pencils.
   d. Take your class out-of-doors.
   Instruct students to examine a tree and to quietly complete their worksheets. Several students may choose the same tree to study.
   e. After 15-20 minutes, have students return to the classroom and discuss the worksheets. If some students observed the same tree, discuss the similarities and differences in their descriptions. Ask, "How might the trees be different during another season?"
   f. Instruct students to draw another tree and list its characteristics based on their observations. Discuss and list these characteristics on the board next to the ones written at the beginning of this lesson. Ask, "What characteristics are present in the second drawing and set of descriptions which were absent in the first drawing?" Discuss why more specific characteristics were added.
4. a. Using the 30 leaves you have collected from three different species of plants, distribute one leaf to each student.
   b. Ask students to do a crayon rubbing of their leaves which will be used as "identification prints."
   c. Ask students to describe their leaves in written form in their journals.
   d. Divide the class into the small groups.
   e. Place each group's leaves in the middle of each group. Have students exchange journals within the group, read each other's descriptions and try to find each other's leaves. If some leaves look similar, the "identification prints" can be used to determine the ownership of the leaf.
   f. Discuss what additional descriptions can be added to help identify each leaf. Have rulers available if students recommend measurement as a description.
   g. Ask students to close their eyes (or use blindfolds) and have them find their leaf from the pile using only their senses of smell and touch.
   h. Discuss which descriptions made it easy to find the correct leaf and which ones made it difficult.
   i. Have students write their reactions to this activity in their journals.

DISCUSSION QUESTIONS:

1. Why do scientists keep journals?
2. What things can be included in journals when participating in the resident outdoor school program?

EVALUATION ACTIVITIES:

1. Review student journals.
2. Discuss the difference between an impression, a feeling, and a scientific observation.
3. Discuss the differences between the drawing and descriptions of a tree from memory and the one which was directly observed.
4. Ask students to list which descriptions of leaves made it easy to identify and which made it difficult.
5. Have students discuss or write down the value of writing and drawing in journals.

KEY TERMS:

journal, senses, observation

CAREER OPPORTUNITIES:

biological illustrator, scientist, writer, researcher, naturalist

TECHNOLOGICAL APPLICATIONS:

People in various professions use journals. Some collect data in their journals, then use computers to help them analyze the data.

ETHICAL CONCERNS:

Honest and objective reporting of observations or experimental results is essential to successful work in science.

INTEGRATION WITH OTHER CURRICULAR AREAS:

1. Writing observations, impressions, and feelings (language arts)
2. Drawing trees and making crayon rubbings (art)
3. Measuring leaves (mathematics)
4. Working with others, discussing, and expressing ideas in writing (social science)

HOME LEARNING SUGGESTIONS:

1. Ask students to spend some time in the out-of-doors and write a paragraph in their journal on what they see, hear, smell, and feel and what they like about the area they are observing.
2. Ask students to record everything they remember in a specific area outside their home. Next, have them survey the area and record their observations. Then have them compare their first list to the actual observations. Discuss what types of things they remembered most and possible reasons for this. Ask them to repeat this exercise with items in a room in their house.
3. Ask students to observe something specific on the way to or from school (e.g., cloud formations, birds, shapes, colors, etc.) and describe it in their journals.
4. Have students find and record in their journals ten very small things, ten very large things, and ten beautiful things.

EXTENSIONS:

1. Ask students to notice something sometime during the day that they have never seen before. Ask them to write in their journals what that something is, describe it as thoroughly as possible, and comment on why they think they have never seen it before. (They may also wish to draw it.) Then divide the class into small groups and have them share what they have written. Group members can try to identify what was described.
2. Ask students to write in their journals daily at the resident outdoor school.
3. Do Project WILD's "Ants on a Twig," where students observe ants or other insects and write their observations in a journal.
4. Do Project WILD's "Animal Poetry," where students write poems about animals.
5. Do Project Learning Tree's "Colors from Nature," where students use drawing and coloring materials from nature.
6. Do Project Learning Tree's "Did You See That Dogwood Bark?" where students compare two different trees.
7. Read excerpts from John Muir's journals or from writings by other naturalists.

CURRICULUM REFERENCES:

Science Framework Addendum:

- Repeated observations and measurements improve reliability of data.
- Scientific laws are generalizations based on many observations.
- Some of the things that scientists do include careful observing, comparing, communicating, measuring and organizing information.

History-Social Science Framework:

- Acquiring information by listening, observing, etc.
- Organizing and expressing ideas clearly in writing and speaking.
- Reaching reasoned conclusions based on evidence.
- Working effectively with others as members of a group.
- Developing group interacting skills.

LESSON ADAPTED FROM:

- "Wild Words...A Journal Making Activity," Project WILD.
- An Environmental Education Curriculum Activities Guide.
- Project EARTH.
- Orange County Outdoor Science School Teacher's Guide.

LOOKING CLOSER, SEEING BETTER

Name: ______________________________

Examine a tree and answer the following questions about the tree:

1. What colors do you see? ______________________________

2. Describe six characteristics about a leaf from your tree (e.g., its color, shape, width and length, smell, feel, etc.).

   a)______________ b)______________ c)______________

   d)______________ e)______________ f)______________

3. Draw your leaf:

4. Describe three characteristics of the bark (e.g., its color, texture, smell, thickness).

   a)______________ b)______________ c)______________

5. Do the branches of the tree point up, down, or straight out? __________

6. What shape is the entire tree? (Triangular, oval, circular, etc.).

   ____

7. What sounds, if any, do you hear in the branches of the tree, inside the bark, etc.?

   ____

8. Look for evidences of animal life in and around your tree (e.g., spider webs, holes, droppings). Record six animal evidences.

   a)______________ b)______________ c)______________

   d)______________ e)______________ f)______________

9. Write down three nonliving things around or close to your tree.

   a)______________ b)______________ c)______________

10. What did you discover about this tree that you didn't know before?

    ____

    ____

PRE-OUTDOOR SCHOOL ACTIVITIES

Lesson 2

SOLAR POWER AND ITS FOOD CHAINS

- -

LESSON SUMMARY: Students participate in a play about photosynthesis. They complete a worksheet and poem to help them understand the concept of food chains.

GENERAL GOAL: To introduce students to the concepts of photosynthesis and energy transfer associated with food chains.

GRADE LEVEL: 5-7 **DURATION:** Two one-hour periods

LEARNING OBJECTIVES:

Upon completion of this lesson, students will be able to:

1. Describe and illustrate the process of photosynthesis and food chains.
2. Define and give examples of a producer, consumer, herbivore, carnivore, omnivore, scavenger, decomposer, and food chain.
3. Classify California's state animals and plants.
4. Trace the energy flow through a food chain by placing organisms in proper sequence.

PROCESS SKILLS USED IN THIS LESSON:

1. Communicating orally, pictorially, and in written form the concepts of photosynthesis and food chains and their associated terms.
2. Grouping and comparing various consumers.
3. Sequencing organisms in a food chain.

BACKGROUND FOR TEACHERS:

1. Chlorophyll is the green colored matter in plants which is necessary in manufacturing food through photosynthesis.
2. Through the process of photosynthesis, plants use the solar energy supplied by the sun's rays and combine it with carbon dioxide and water to produce sugars, which are essential to the life of plants. Plants usually make more food than they need to survive, so they store sugars as starch until they need the energy.
3. The energy of the sun is captured by a plant during photosynthesis and is transferred to an animal when the plant is eaten. It is transferred again when that animal is eaten by another animal. In this way, energy is passed through the community. This energy flow is called a food chain. A food web is made up of many food chains.
4. Plants are called producers because they make (or produce) their own food by using the sun's energy.
5. Animals are called consumers because they cannot make their own food, but must consume plants and/or other animals to acquire their energy.
6. Herbivores are animals that depend on food produced and stored by plants to survive. Herbi means plants and "vore" means eater.

7. Carnivores are animals that depend on other animals for food. "Carni" means meat.
8. Predators hunt and eat animals.
9. An animal which is hunted and eaten by a predator is called prey.
10. Omnivores feed directly on both plants and animals. "Omni" means everything or all.
11. Animals which feed on dead animals (which they haven't killed) are called scavengers. These include birds (turkey vultures, magpies), mammals (such as coyotes), insects (such as fly larvae, scavenger beetles), etc.
12. When plants and animals die, tiny organisms called decomposers break them down into various chemicals. Many of these chemicals (including nitrogen, phosphorus, and potassium) are used as nutrients by plants. Some decomposers are insects. Most decomposers are protists, which are living things that are not easily classified as plants or animals. Protists include bacteria, fungi, and protozoans.
13. Plants use minerals and other nutrients released by the decomposers to survive and grow.
14. A natural community consists of a group of living things in a particular area which is bound together by food chains and other interrelationships.
15. An ecosystem consists of a community of living things interacting with one another and with the physical environment.

PREPARATION FOR LESSON:

Materials for Students:

Name tags for each of the 17 cast members in "Act 1, Photosynthesis Gets It Together"
Student Worksheet, "Components in a Community" (II Pre 2, SW)
Student Handout, "California's State Plants and Animals" (II Pre 2, SH)

Materials for Teachers:

"Act 1, Photosynthesis Gets It Together" (II Pre 2)
Chalkboard
Transparency A, "The Process of Photosynthesis" (II Pre 2, TA)
Teacher Pages A and B, "Food Chain Cards" (II Pre 2, TPA and TPB)
Overhead Projector
"Key Terms" (II Pre 2, TPC)

INSTRUCTIONAL STRATEGY:

1. Challenge students to determine the definition of photosynthesis based on the following activity.
2. Using "Act 1, Photosynthesis Gets It Together," assign parts to students and distribute name tags. Ask students to act out directions read by the narrator.
3. Following the dramatization, discuss the process of photosynthesis.
4. Ask students to illustrate the process of photosynthesis on a piece of paper and label the following: sun, chlorophyll, water, carbon dioxide, oxygen, sugar.
5. Using Transparency A, review the process of photosynthesis.
6. Distribute Student Worksheet, "Components in a Community" and associated handout, "California's State Plants and Animals." The handout provides clues to help students complete the first page of the worksheet.

7. Discuss the answers to the questions on the worksheet. Read the Food Chain Poem together.
8. Using a cut-up copy of Teacher Page A, implement the Food Chain Game. Distribute Food Chain Cards to 12 students. Ask them to position themselves (without talking) in the proper sequence. Other class members should observe the sequence and act as judges. Repeat the activity with Teacher Page B using different students.
9. Discuss problems that students encountered when placing themselves in a food chain order.

DISCUSSION QUESTIONS:

1. Why are plants usually called producers?
2. Why are animals called consumers?
3. Discuss the definition of a community.
4. How might humans influence a community of plants and animals?
5. What would happen if all plants in a community died?
6. What would happen if all animals in a community died?
7. What could kill all plants or animals in a community?
8. Do you think that the world would be better off if we were able to kill all mosquitoes? Why or why not?

EVALUATION ACTIVITIES:

1. Correct Student Worksheets.
2. Evaluate student answers to the discussion questions.

KEY TERMS:

carnivore
chlorophyll
community
consumer
decomposer
food chain
herbivore
omnivore
organism
photosynthesis
predator
prey
producer
protist
scavenger

CAREER OPPORTUNITIES:

ecologist, botanist, biologist

TECHNOLOGICAL APPLICATIONS:

Although technological progress helps society in many ways, some technological advances are creating pollution problems in the environment. For example, fertilizers are essential to plant growth and are used extensively to improve crop yields. Most commercial fertilizers are made from petroleum products. Fertilizers applied to crops often wash into waterways including groundwater, streams, rivers, and lakes. This extra fertilizer in the water may cause dramatic increases in the growth of algae. When algae dies, decomposers which break down this algae use up valuable oxygen in the water. This adversity affects aquatic animal life which depends on well-oxygenated water for survival.

ETHICAL CONCERNS:

The pollution of air and water decreases photosynthesis. Scientists are concerned about the implications of this phenomenon.

INTEGRATION WITH OTHER CURRICULAR AREAS:

1. Illustrating the process of photosynthesis (art)
2. Dramatizing of photosynthesis (performing arts)
3. Writing and completing a poem (language arts)
4. Working with others, discussing, and expressing ideas (social science)

HOME LEARNING SUGGESTIONS:

1. Have students locate and list some producers and consumers.
2. Have students categorize various pets into: herbivores, carnivores, omnivores, scavengers.

EXTENSIONS:

1. Place a drop of iodine on a piece of potato, radish, and/or other root crops to test for starch (stored food). Iodine will turn dark purple in the presence of starch.
2. Play charades using the ecological terms learned in this lesson. Have small groups of students act out a definition while other students guess the word.
3. Do Project WILD'S "What's for Dinner?" where students list and analyze sources of foods and generalize that all animals, including people, depend on plants as a food source.
3. Do Project Learning Tree's "Did You Ever Eat a Pine Tree?" where students state the importance of the forest and other plant communities as a source of food for humans and other animals.
4. Do Project WILD's "What Did Your Lunch Cost Wildlife?" where students trace some foods back to their source, determine environmental impacts and make recommendations to lessen negative impacts.
5. Use a computer program to make up a crossword puzzle which utilizes words listed under "Key Terms."

CURRICULUM REFERENCES:

Science Framework Addendum:

- Most ecosystems derive their energy from the sun through photosynthesis in green plants (producers). Animals (consumers) and some plants acquire their energy from plants and/or other animals. Decomposers obtain their energy from dead plant and animal matter and animal waste products.
- Food chains and food webs indicate the eating patterns of the members of an ecosystem.

History-Social Science Framework:

- Acquiring information by listening, observing, etc.
- Developing group interacting skills.
- Reaching reasoned conclusions based on evidence.

LESSON ADAPTED FROM:

- All Around You: An Environmental Study Guide.
- Orange County Outdoor Science School Teacher's Guide.
- Environmental Theme Lessons.
- CALM Lessons.

ACT I
Photosynthesis Gets It Together

Cast:

1 Sun
5 Green Plants
5 Chlorophylls
3 Water Droplets
3 Carbon Dioxides
1 Narrator

Materials: Name tags (sun, green plant, etc.) for each cast member.

Preparation:

- On the back of each carbon dioxide tag, print "sugar."
- On the back of each water tag, print "oxygen."

As the narrator reads the action, cast members should act out their parts. All characters should remain quiet so that they can hear stage instructions.

The sun rose one warm March day and began shining brightly. It was strong and full of energy, and it sent lots of light streaming to the earth.

On the ground, green plants were waking up from a restful night. "We must get ready to produce food energy," they said as they woke up the sleeping chlorophylls. The green plants and the chlorophylls joined hands and made a circle.

The chlorophylls were eager as usual to begin work. Green eyes dancing merrily, they cried, "Bring on the water!"

The green plants begin to moan as they started to work. Their roots reached deep into the earth and soaked up water from the soil. The water traveled up the root hairs, through the roots. Now we can see the three water droplets entering the chlorophyll/green plant circle by crawling under their arms.

The sun meanwhile continues to beam down on the plants.

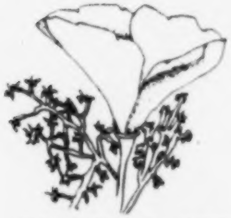
"Bring on the carbon dioxide," cried the chlorophyll. The green plants opened their stomata and let in the carbon dioxide which was floating by. The carbon dioxides carefully entered the chlorophyll/green plant circle by stepping over their arms.

"Now we can begin," cried the chlorophyll. The green plant and chlorophyll circle slowly rotated around the carbon dioxide and water which were now in the center of the circle. The sun's energy continued to pour in, and lo and behold, something began to happen. Carbon dioxide and water began to mix around...and...and...and...They slowly began to turn into sugar and oxygen. As they flipped over their name cards, these characters realized that the photosynthesis process had changed them. The sugar sat down in the middle of the circle as the stored energy that it was, and the oxygen floated out of the circle and up into the atmosphere.

Then all the characters got together and cheered the sun since it is the source of energy for all living things. They cheered the green plants because they are the only living things that could use the sun's energy to make it into stored food energy.

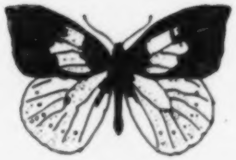
(II Pre 2, SH)

CALIFORNIA'S STATE PLANTS AND ANIMALS



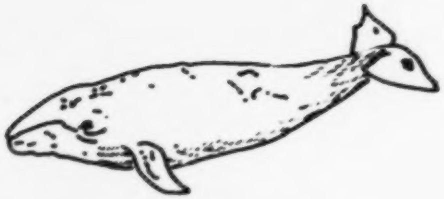
CALIFORNIA POPPY

An orange colored wildflower which blooms in the spring. Grows in open fields throughout California.



CALIFORNIA DOGFACE BUTTERFLY

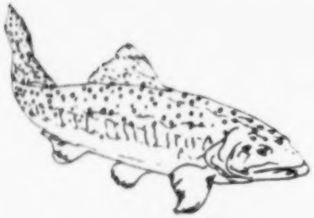
Drinks nectar from flowers such as Clover and False Indigo. Lives in foothills and lower mountain slopes.



CALIFORNIA GREY WHALE

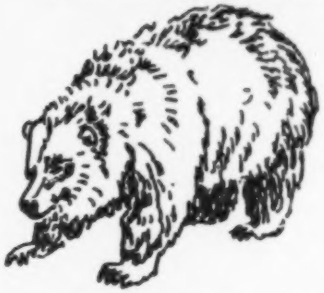
Eats Krill (small shrimp-like animals) in coastal waters. Also feeds on sardines when in Mexican waters.

11.72



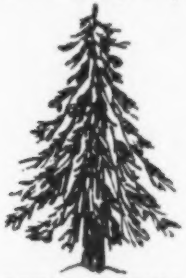
GOLDEN TROUT

Eats insects and other invertebrates.Lives in streams throughout California (especially in the Sierras).



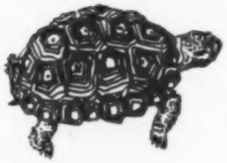
CALIFORNIA GRIZZLY BEAR

Ate many kinds of plants including roots, fungi, and berries.Also ate fish, insects, large and small mammals, and carrion (dead animals). Extinct in California.



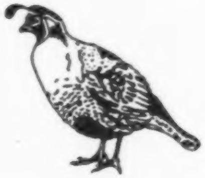
COASTAL REDWOOD

This tree can grow to a height of over 350 feet! Grows on the coast of northern California.



DESERT TORTOISE

Eats desert grasses, wildflowers, and cactus fruit. Lives in the desert.



CALIFORNIA QUAIL

Eats seeds and insects. Lives in chaparral, woodlands, and close to suburban areas.

COMPONENTS IN A COMMUNITY

Name: ______________________________

1. Green plants (including trees) are called producers. They use sunlight, air, water and nutrients in the soil to produce their own food. They also produce food for animals. List two producers from the Handout, "State Plants and Animals of California," and the place where they are found. Then list an additional producer.

Producers	Place Usually Found
a)	a)
b)	b)
c)	c)

2. Consumers are animals. Some consumers eat only plants. These consumers are called by the special name herbivores. Think of the word herb. Herbs are plants. "Vore" means eater. Herbivores are plant eaters. Write down two herbivores from the Handout. Name the plants they depend on for food. Then record an additional herbivore and what plant it might eat.

Consumers: Herbivores	Plants Consumed for Food
a)	a)
b)	b)
c)	c)

3. Some consumers eat other animals for food. These consumers are called carnivores. "Carne" means meat. List one carnivore from the Handout. Record two additional carnivores. Name an animal that each carnivore might eat.

Consumers: Carnivores	Animals It Might Eat
a)	a)
b)	b)
c)	c)

4. Could some consumers eat both plants and animals? ____________. These consumers are called omnivores. "Omni" means everything. Write down two omnivores from the Handout and name a plant and animal that each omnivore might eat. Then record an additional omnivore and its possible food.

Consumers: Omnivores	Plants and Animals Consumed (Eaten)
a)	a)
b)	b)
c)	c)

Name: ______________________________

5. a. Do you think you are a consumer? ______________________________

   b. Describe your favorite dinner: ______________________________

   ____

   c. Are there plants, animals or both in your favorite dinner? ________

   d. Are you an herbivore, carnivore or omnivore? ____________________

6. Scavengers eat dead things. What animal might eat dead things?

   ____

7. Most decomposers are bacteria and fungi. Scientists place bacteria and fungi into a group called protists. Protists are living things which are not easily classified as plants or animals. Decomposers break down the decaying parts of plants and animals and return them to the soil where plants can use them to help them grow. Why are decomposers important in the environment? ____

   ____

8. A food chain is an arrangement of living things according to the order in which they are eaten and the way their energy is passed. For example: grass ---- grasshopper ---- bird ---- bobcat. If all grass died, the grasshopper "may not last." What could happen to the bobcat? Why?

   ____

   ____

9. A mouse, wheat grass, and a fox are part of a food chain. Place the three in order by how energy is passed from one food source to another.

   a. 1. ____________ ---- 2. ____________ ---- 3. ____________

   b. Is #1 a producer, herbivore or carnivore? ________________

   c. Is #2 a producer, herbivore or carnivore? ________________

   d. What is #3? ________________

   e. What else can eat wheat grass? ________________

   f. What else can eat a mouse? ________________

   g. Draw a food chain with the animals in e and f.

   Wheat grass ---- ____________ ---- ______________.

Name: ______________________________

10. Read the Food Chain Poem below and fill in the blanks. The last two words of each paragraph rhyme. Most answers can be found on this worksheet.

I'm a producer. I'm a good dude.
I can take sunshine and turn it into ________________.

I am an herbivore, yes I am.
I eat ____________ whenever I can.

I am a carnivore, I am neat.
'Cause what I eat is good raw ______________.

I am an omnivore, I'm proud to be.
____________ and ____________ are the best for me.

I am a scavenger, that's important to you,
'Cause I eat ____________ stuff, pew, pew, pew.

I'm a decomposer, I am royal,
'Cause I break things down into the ________________.

This is a food chain, energy is passed
If one of these is missing, this planet won't ______________.

I am a human being and I understand,
That I should love and care for this ________________.

(II Pre 2, TPA)

FOOD CHAIN CARDS

A SUN	A WHEAT GRASS	A MOUSE
A FOX	A DEATH	A INVERTEBRATES FUNGI AND BACTERIA
A PLANT NUTRIENTS	A ALGAE	A SUCKER FISH
A BASS	A DEATH	A CRAYFISH

ANSWER: SUN → WHEAT GRASS → MOUSE → FOX → DEATH → INVERTEBRATES, FUNGI & BACTERIA → PLANT NUTRIENTS → ALGAE → SUCKER FISH → BASS → DEATH → CRAYFISH

(II Pre 2, TPB)

FOOD CHAIN CARDS

B SUN	B FLOWER	B INSECT
B LIZARD	B SNAKE	B HAWK
B DEATH	B INVERTEBRATES, FUNGI AND BACTERIA	B PLANT NUTRIENTS
B OAK TREE WITH ACORNS	B ACORN WOODPECKER	B OWL

ANSWER: SUN → FLOWER → INSECT → LIZARD → SNAKE → HAWK → DEATH → INVERTEBRATES, FUNGI & BACTERIA → PLANT NUTRIENTS → OAK TREE WITH ACORNS → ACORN WOODPECKER → OWL

KEY TERMS

1. CARNIVORE -- An organism which eats animals.
2. CHLOROPHYLL -- The green colored matter in plants which is necessary in manufacturing food through photosynthesis.
3. COMMUNITY -- A group of plants and/or animals sharing a particular environment which are bound together by food chains and other interrelationships.
4. CONSUMER -- An animal which eats plants and/or other animals.
5. DECOMPOSER -- A plant or animal which feeds on dead material and causes its mechanical or chemical breakdown.
6. FOOD CHAIN -- An arrangement of living things according to the order in which they were eaten.
7. HERBIVORE -- An animal which eats plants.
8. OMNIVORE -- An animal which eats plants and animals.
9. ORGANISM -- A living thing.
10. PHOTOSYNTHESIS -- The process used by plants to manufacture food for themselves. It uses the sun's energy to combine carbon dioxide, water, and minerals to produce proteins and carbohydrates (in the forms of sugar and starches).
11. PREDATOR -- Organism which hunts and eats animals.
12. PREY -- An animal hunted by another animal.
13. PRODUCER -- Any green colored plant.
14. PROTISTS -- Living things which are not easily classified as plants or animals and include bacteria, fungi, protozoans, and algae.
15. SCAVENGER -- An animal which eats dead remains and wastes of other animals and/or plants.

PRE-OUTDOOR SCHOOL ACTIVITIES

Lesson 3

TYING IT ALL TOGETHER

- -

LESSON SUMMARY: Students draw and discuss food webs and diagram ways components in an ecosystem interact.

GENERAL GOAL: To develop an understanding of the interdependence of living organisms and nonliving components in a given ecosystem.

GRADE LEVEL: 5-7 **DURATION:** Two one-hour periods

LEARNING OBJECTIVES:

Upon completion of this lesson, students will be able to:

1. Define natural community, environment, and ecosystem.
2. Arrange the sequence in which animals and plants may be eaten in a food web.
3. Determine various ways organisms interact.
4. List five things animals need to survive.
5. Categorize requirements of animals into living and nonliving things.
6. Illustrate and discuss the interdependence of living and nonliving components in an ecosystem.

PROCESS SKILLS USED IN THIS LESSON:

1. Communicating orally, pictorially, and in written form.
2. Sequencing organisms in a food web.
3. Concluding that a food web in a natural community demonstrates an exchange of energy and nutrient flow.
4. Analyzing parts of an ecosystem.
5. Predicting consequences of removing an organism from an ecosystem.

PREREQUISITE KNOWLEDGE FOR STUDENTS:

Concept of a food chain and associated terms including herbivore, omnivore, carnivore, producer, consumer, photosynthesis, etc. It is recommended that Pre-outdoor School Activities, Lesson 2, "Solar Power and Its Food Chains," be completed prior to this lesson.

BACKGROUND FOR TEACHERS:

1. A habitat is the region where a plant or animal naturally lives. For animals, a habitat must include oxygen, food, water, shelter, and space suitable to their needs. These habitat components must be arranged in a way that is usable by the animal.
2. A natural community consists of a group of plants and animals in a particular area which are bound together by food chains and other interrelationships.

3. Scientists often classify natural communities according to the type of vegetation (plant species) found in an area. For example, some plant communities in California include the following: North Coastal Forest, Chaparral, Valley and Foothill Woodland, Valley Grassland, Riparian Woodland.[1] Each plant community supports specific animals. For example, the Black-Tailed Jackrabbit, Coyote, Deer Mouse, and Red-Tailed Hawk (see Transparency A) are typically found in a Valley Grassland Community.[2] However, some of these wildlife species may also live in the Chaparral or other plant communities which meet their habitat needs.
4. An environment is the surroundings, conditions, and influences of a plant or animal, including other plants and animals, water, air, climate, soil, etc. All living things depend on their environment to meet their basic needs.
5. An ecosystem is an area of any size consisting of all living things and their environment which are interdependent and linked together by energy and nutrient flow.
6. Through the process of photosynthesis, green plants use the sun's energy to produce sugar by chemically combining chlorophyll (in leaves), carbon dioxide, and water. The elements nitrogen, phosphorous, and potassium are major nutrients necessary for plant growth.
7. Plants are at the base of all food chains. When a plant is eaten, the stored energy is passed to the next organism in the food chain. A food web is made up of an interlocking pattern of food chains.
8. Predation is a form of food web interaction which helps keep animal populations in balance within the community. Predator population size is usually controlled by the abundance or lack of prey. In addition, predators usually have very low reproductive rates, while prey species usually have high reproductive rates. This ensures a continuous food supply for predators.

PREPARATION FOR LESSON:

Materials for Students:

Student Worksheet 1, "A Chaparral Community" (II Pre 3, TB & SW1)
Student Worksheet 2, "Linking the Living and the Nonliving" (II Pre 3, SW2)
Homework Assignment 1, "Interdependence of Organisms" (II Pre 3, HA1)
Homework Assignment 2, "Animal Research" (II Pre 3, HA2)
Field guides

Materials for Teachers:

Chalkboard
Transparency A, "Food Web in a Valley Grassland Community" (II Pre 3, TA)
Transparency B, "A Chapparal Community" (II Pre 3, TB SW1)
Transparency C, "Nonliving Things" (II Pre 3, TC)
Transparency D, "Chaparral Ecosystem" (II Pre 3, TD)
Food Web in a Valley Grassland Community (Answer Sheet) (II Pre 3, TA Ans)
Overhead Projector

INSTRUCTIONAL STRATEGY:

1. Introduce the concept of a natural community. Stress that only living things are considered in a community.

2. Using Transparency A, ask students how organisms in this Valley Grassland Community can be connected to illustrate how energy is transferred from a food source to the animal eating the food. You might ask the students to identify an herbivore on the transparency. Then ask, "What is a possible food source for this animal and what is a possible predator of this animal?" Draw an arrow from the herbivore's food source to the herbivore, and one from the herbivore to its predator. Arrows should be drawn from the source of food to the animal that is eating the food, thus illustrating the energy flow. Connect remaining organisms. (See "Answers to Transparency A.")
3. Distribute Student Worksheet 1, "A Chaparral Community" (same as Transparency B), pencils, and crayons to each student. Ask students to draw arrows to represent the order in which plants and animals may be eaten. Make sure arrows indicate the correct direction of the flow of energy. Discuss answers.
4. Use Transparency B to discuss Student Worksheet 1 and the following questions:
   a. What would happen if the carnivores outnumbered the herbivores?
   b. What effect could breaking a relationship in the community have on the other organisms?
   c. What could happen to the prey species if all carnivores were removed from the community? Consider the possibilities of overpopulation, limited food, space, etc.
   d. Why have humans reduced, and in some cases eliminated, predators in certain areas? What could be some results of this action? If all predators are removed, what could happen to the prey species?
5. Assign Homework Assignment 1, "Interdependence of Organisms."
6. Review Homework Assignment 1 and discuss ways living things interact.
7. Ask students what animals need in order to survive and list these on the board. (Include oxygen, water, shelter, and space in an arrangement useful to the animals.)
8. Categorize the list according to living and nonliving things.
9. Using Transparency C, discuss nonliving things which can be present in an environment.
10. Using Transparency D, introduce the concept of an ecosystem, which includes nonliving components as well as the living community.
11. Distribute a copy of Student Worksheet 2, "Linking the Living and the Nonliving," and crayons to each student.
12. Ask students to connect the circles with straight lines to represent various relationships. They should be prepared to describe each relationship. For example, plants need nutrients and sunlight to grow, insects for pollination, and dead animals such as mice for fertilizer.
13. When students have completed their worksheets, discuss the relationships represented. For example:
    - o hawks need mice for food, plants to feed mice and for nesting, insects to pollinate plants, sun to help plants grow, decomposers to provide plant nutrients, plant nutrients to help plant grow;
    - o insects need plants for food, sun to help plants grow, decomposers to provide plant nutrients, plant nutrients to help plants grow;
    - o mice need plants for food and for nesting material, sun to help plants grow, decomposers to provide plant nutrients, plant nutrients to help plants grow, insects to pollinate plants (and to feed on);
    - o nutrients need bacteria and fungi to decompose dead plants and animals;
    - o owls, mice, insects, and bacteria need air (oxygen).

DISCUSSION QUESTIONS:

1. What is the role of predators in an ecosystem?
2. How could air and water pollution affect various relationships illustrated in "Linking the Living and the Nonliving?"
3. While projecting Transparency D, discuss how the construction of a housing project, shopping mall, or other development could affect this natural community.
4. How can humans influence the balance of animal and plant populations?
5. How could development projects be designed to co-exist with natural communities?

EVALUATION ACTIVITIES:

1. Discuss the differences among a community, an environment, and an ecosystem.
2. Ask students to list five things animals need to survive and categorize them according to living and nonliving elements.
3. Review Homework Assignments 1 and 2.

KEY TERMS:

carnivore
community
ecosystem
environment
food web
habitat
herbivore
interdependence
omnivore
organism
population
predator
prey

CAREER OPPORTUNITIES:

ecologist, biologist

TECHNOLOGICAL APPLICATIONS:

Our technological advances have created ecological problems such as air, water, and land pollution and the depletion of natural resources.

ETHICAL CONCERNS:

1. Human intervention in the environment continues to change plant and animal distribution, diversity, and abundance.
2. Increasing human populations and technologies often require space and activities which are detrimental to plants and animals and their habitats.
3. Loss and degradation of habitat are considered the main reasons for the loss of plant and animal life.
4. Some predators (carnivores) have been reduced or eliminated by humans in many parts of our country.

INTEGRATION WITH OTHER CURRICULAR AREAS:

Drawing food webs (art)
Communicating orally and in writing (language arts)

HOME LEARNING SUGGESTIONS:

Have students complete Homework Assignment 1, "Interdependence of Organisms."

Have students complete Homework Assignment 2, "Animal Research."

EXTENSIONS:

1. Ask students to research which natural communities contain the following state animals and plants: California quail, golden poppy, coastal redwood, California gray whale, dogface butterfly. Have students place each organism into an appropriate food web. Ask students to determine where the grizzly bear used to live in California.
2. Have students construct mobiles to illustrate food webs. Use clothes hangers and attach pictures or drawings of animals and plants.
3. Do Project Learning Tree's "Web of Life," in which students research and illustrate a forest ecosystem.
4. Do C.L.A.S.S. Project's "Making a Place for Wildlife," where students design a habitat for a group of plants and animals.
5. Have students draw a food web containing organisms found on their school grounds, in their neighborhood and town, or that they predict exist at the resident outdoor school.
6. Have students make dioramas of various communities or ecosystems.

CURRICULUM REFERENCES:

Science Framework Addendum:

- Food chains and food webs indicate the flow of energy that maintains an ecosystem.

History-Social Science Framework:

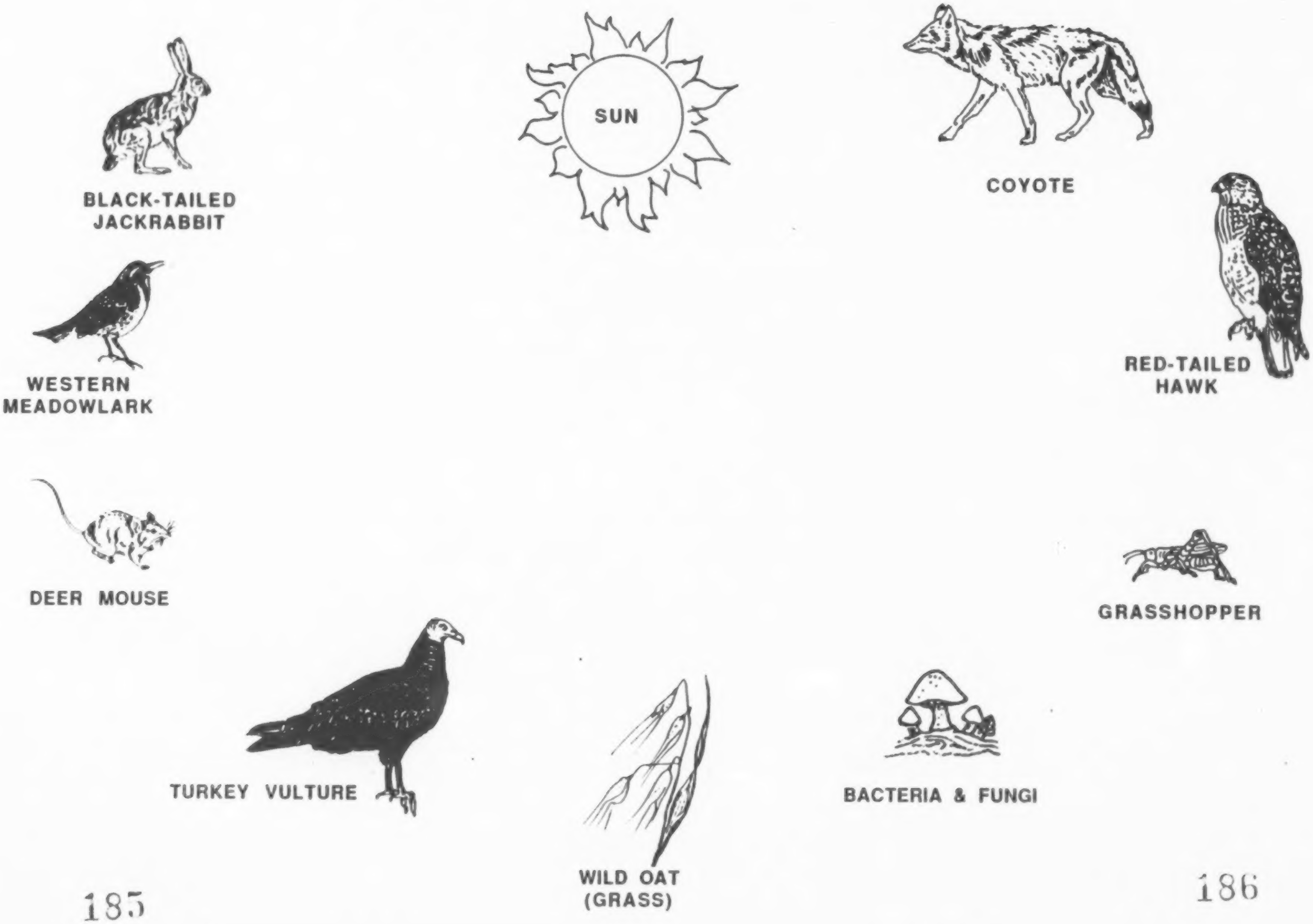
- Acquiring information by listening, observing, reading, etc.
- Expressing ideas.
- Solving problems and drawing conclusions.

LESSON ADAPTED FROM:

- "Ecosystems, Lesson 6, Food Wed,: Orange County Outdoor School Teacher's Guide.
- Santa Cruz County Resident Outdoor Education Program Teacher's Guide.
- "Food Webs," Project EARTH.

(II Pre 3, TA)

FOOD WEB IN A VALLEY GRASSLAND COMMUNITY


SUN
COYOTE
BLACK-TAILED JACKRABBIT
RED-TAILED HAWK
WESTERN MEADOWLARK
DEER MOUSE
GRASSHOPPER
TURKEY VULTURE
WILD OAT (GRASS)
BACTERIA & FUNGI

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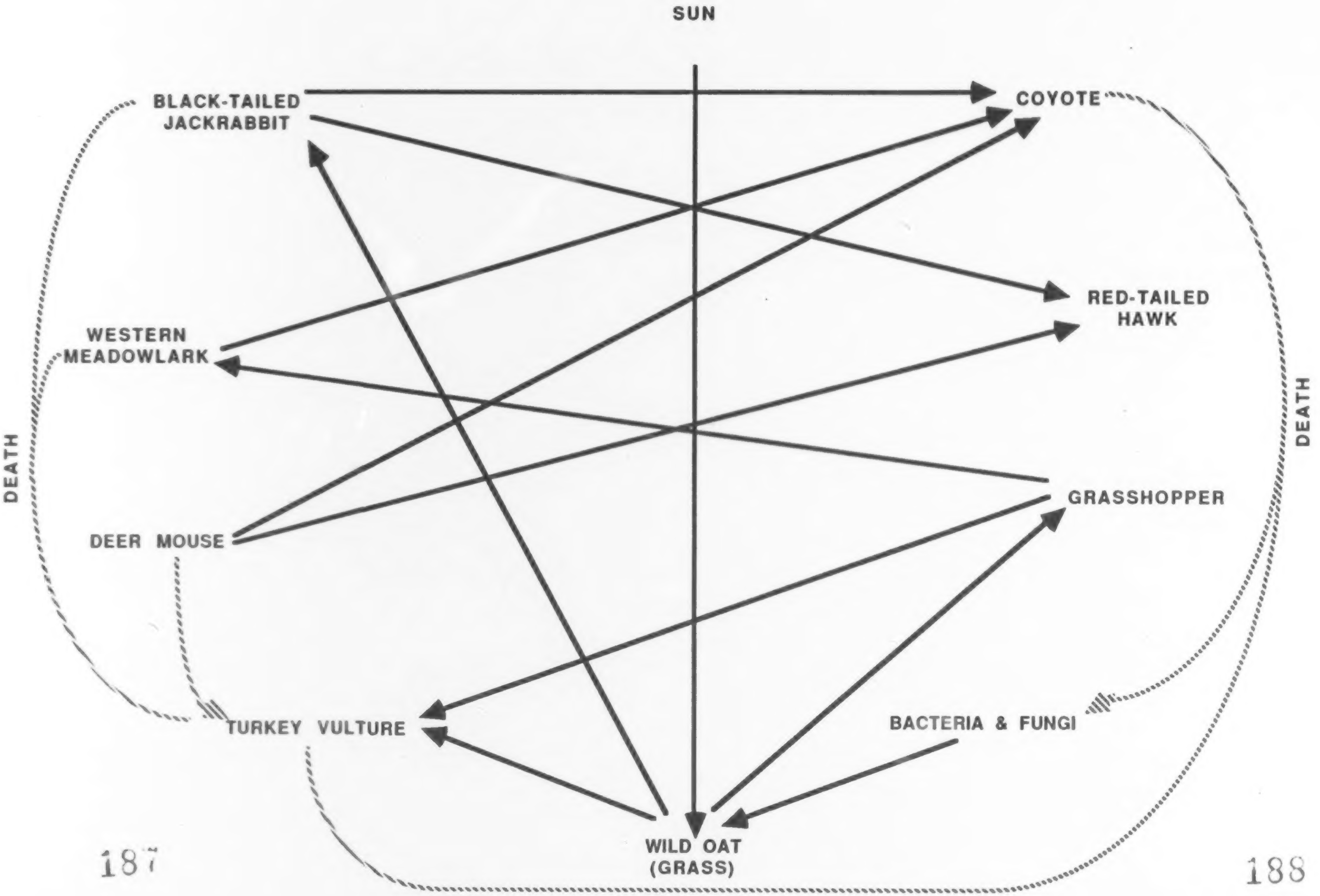
(II Pre 3, TA ANS)

FOOD WEB IN A VALLEY GRASSLAND COMMUNITY

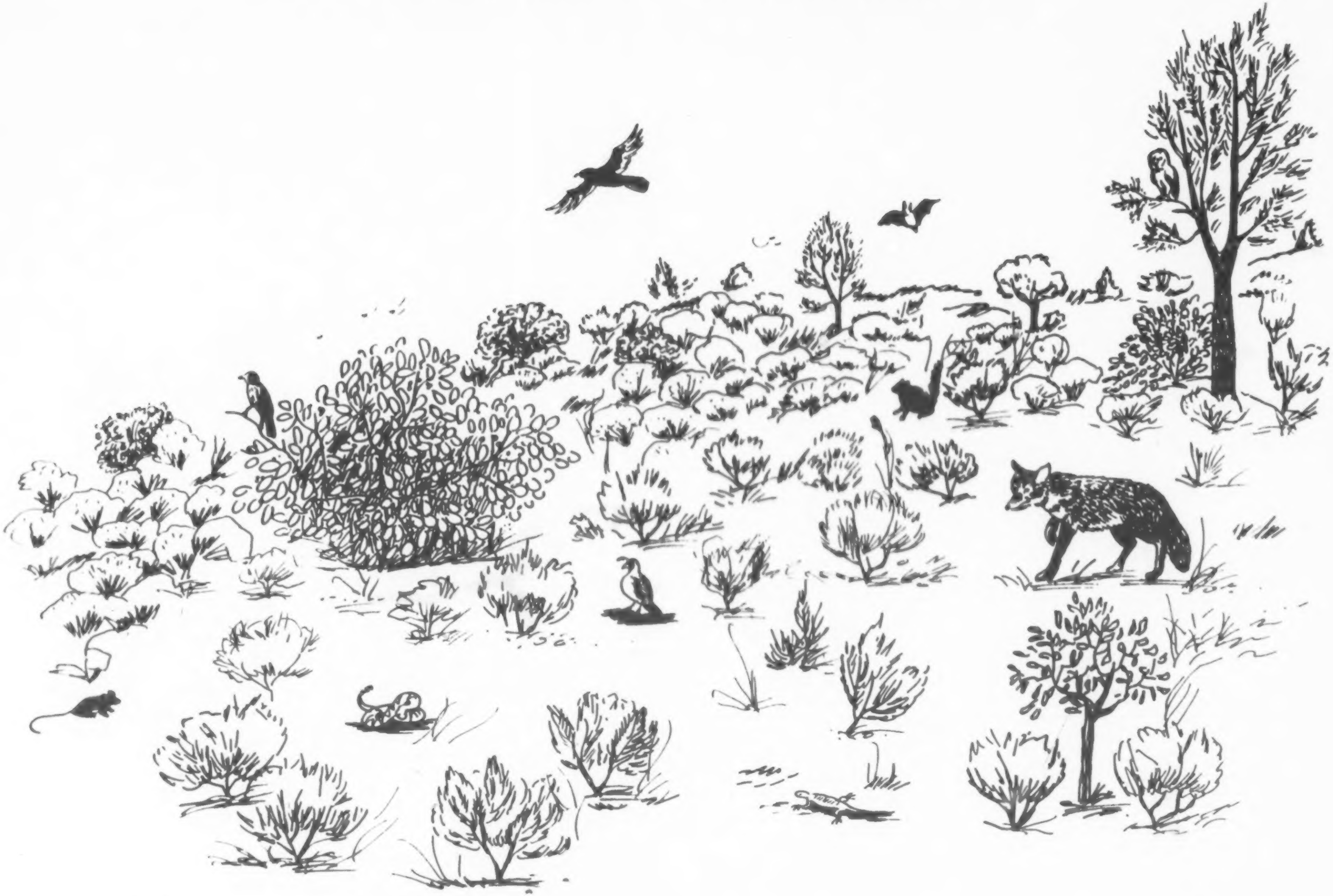
(ANSWER SHEET)


SUN
BLACK-TAILED JACKRABBIT
COYOTE
RED-TAILED HAWK
WESTERN MEADOWLARK
GRASSHOPPER
DEER MOUSE
TURKEY VULTURE
BACTERIA & FUNGI
WILD OAT (GRASS)
DEATH
DEATH

II.85

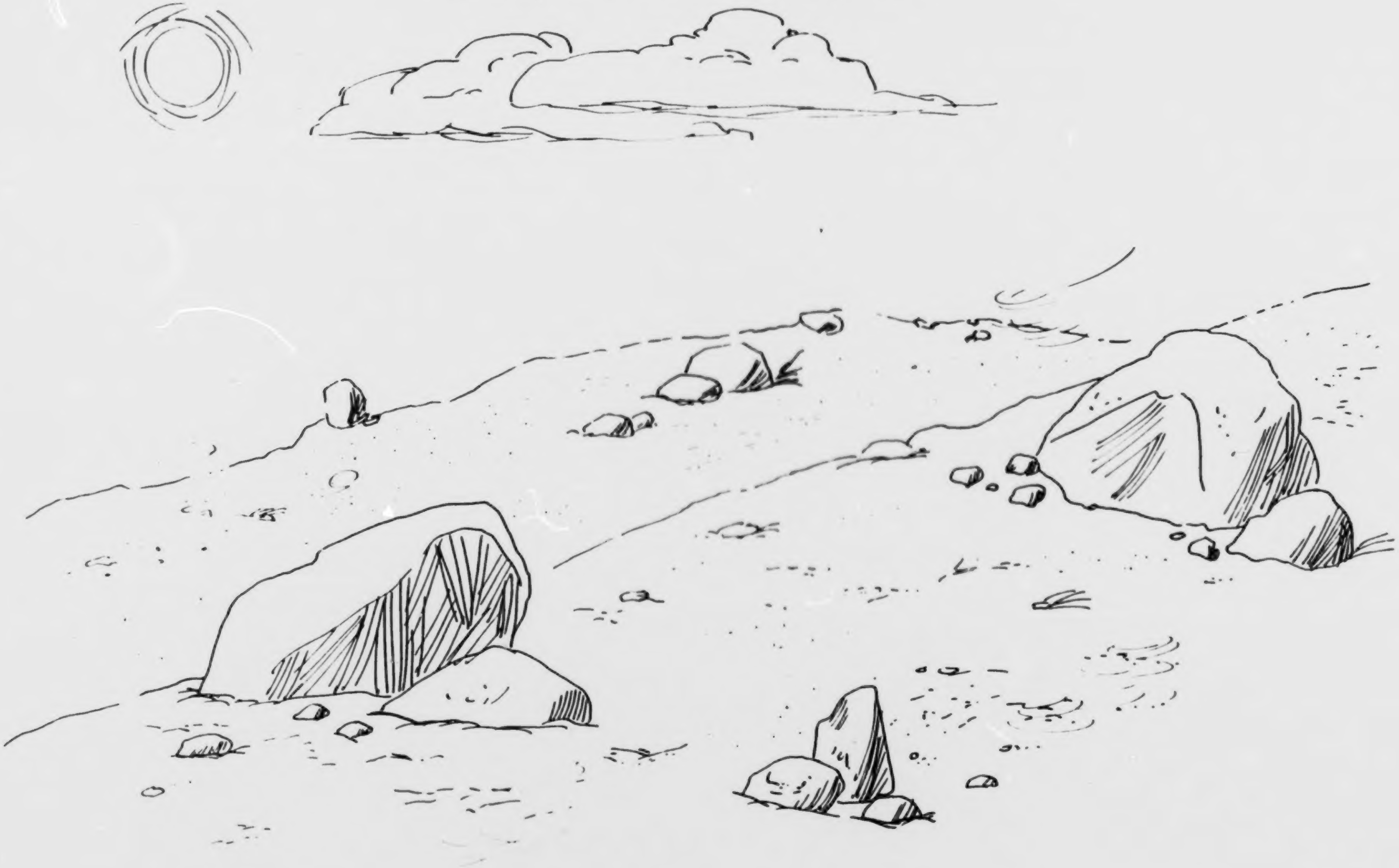
A CHAPARRAL COMMUNITY

(II Pre 3, TB & SWI)



(II Pre 3, TC)

NONLIVING THINGS



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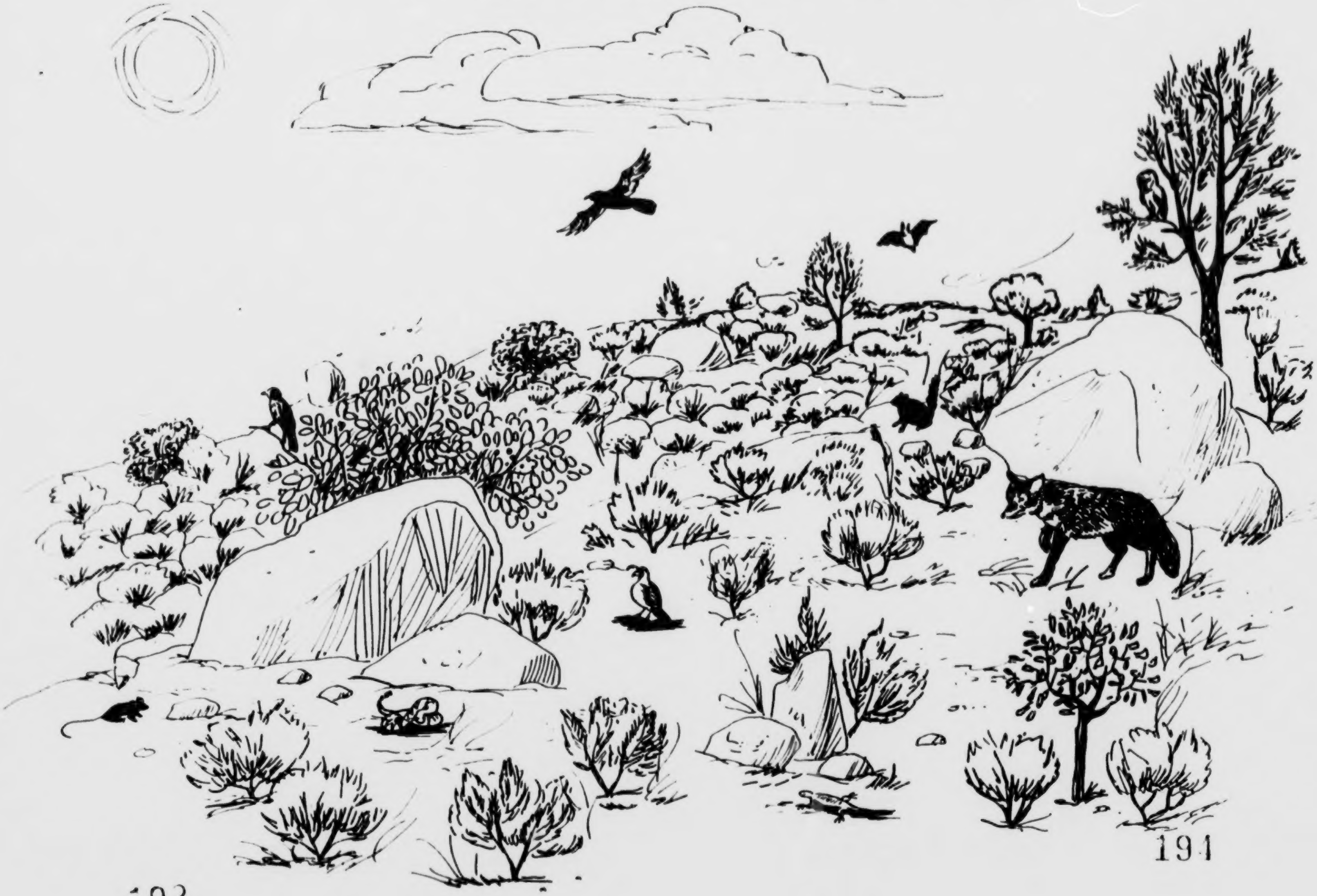
(II Pre 3, TD)

A CHAPARRAL ECOSYSTEM



TRANSPARENCY B

A CHAPARRAL COMMUNITY

LIVING THINGS -- A COMMUNITY

Picture of a Chaparral Community
in California

Plants

Scrub Oak
Digger Pine
Manzanita
Chamise
Grass

Animals

Mammals: Coyote
Calif. Ground Squirrel
White-footed Mouse
Bats

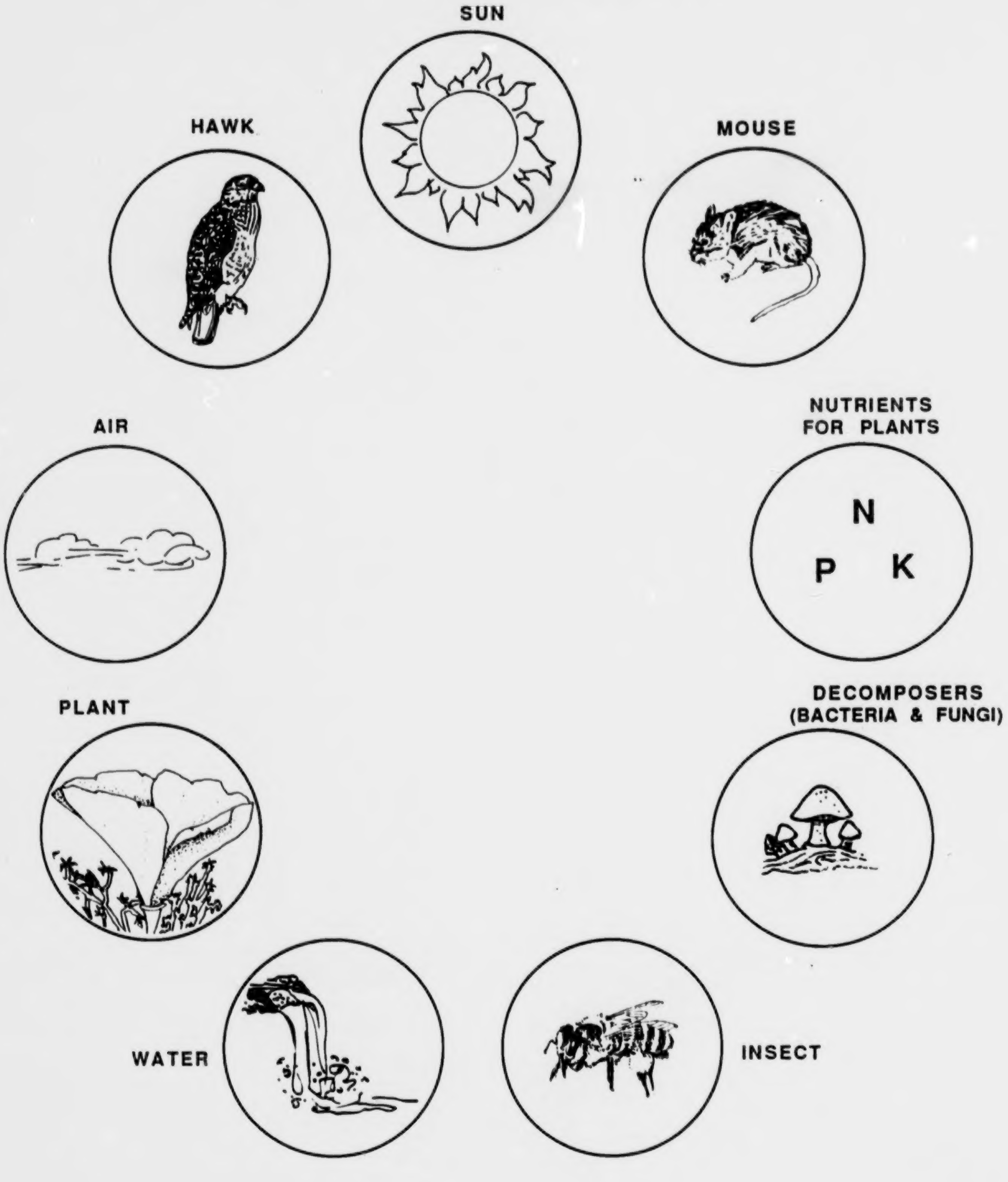
Birds: Turkey Vulture
Red-tailed Hawk
Scrub Jay
California Quail

Reptiles: Rattlesnake
Western Fence Lizard

Amphibian: Western Toad
Insects Bees, Flies, Beetles

(II Pre 3, SW2)

LINKING THE LIVING AND THE NONLIVING


SUN
HAWK
MOUSE
AIR
NUTRIENTS FOR PLANTS
N
P
K
PLANT
DECOMPOSERS (BACTERIA & FUNGI)
WATER
INSECT

INTERDEPENDENCE OF ORGANISMS

Study these three columns of words. Notice that the words in the two side columns are names for organisms, while the middle column contains boxes which describe different ways these organisms can interact. With your pencil, try to connect all living things to one another. An interaction box must come between every pair of organisms that you join up. You can use the same organism or interaction box more than once. One pair has been joined for you already. Begin at the arrow.

Organisms	Interaction Boxes	Organisms
rabbit		lizard
honeybee	hides or makes a home in	snake
ant		squirrel
grasshopper	depends upon	spider
mouse		woodpecker
oak tree		owl
fly	provides food for	grass
flower		coyote

Name ______________________

ANIMAL RESEARCH

Answer these questions about an animal which might live in your area. You may find the information in field guides and other reference books in the library. You might observe the animal around the area where you live (in your backyard or on the way home from school, etc.). You will already know some information from past lessons.

Name of the animal you are researching ______________________________.

1. What must your animal have in its environment in order to survive?

   ____

   ____

   ____

2. Where does your animal usually live? (e.g., on the ground, in the ground, in the water) ______________________________

3. What shelter or cover does your animal require? ______________________________

4. What might your animal eat? ______________________________

   ____

5. Is your animal a/an (circle one): carnivore, omnivore or herbivore?

6. What might eat your animal? ______________________________

7. What other animals are found in the area where your animal lives?

   ____

8. What plants are found in the area where your animal lives? __________

   ____

9. How are these plants important to your animal? ______________________________

   ____

10. On the back of this sheet, draw a food web consisting of at least 6 organisms (living things) including your animal. Then add the nonliving things these organisms need in order to survive.

PRE-OUTDOOR SCHOOL ACTIVITIES

Lesson 4

THE LOOKS HAVE IT

LESSON SUMMARY: Students analyze pictures and descriptions of several organisms to identify, classify, and determine the function of various adaptations.

GOAL: To understand that all organisms have specific adaptations which make their survival possible.

GRADE LEVEL: 5-7 **DURATION:** Two one-hour periods

LEARNING OBJECTIVES:

Upon completion of this lesson, students will be able to:

1. Define the word adaptation.
2. Identify at least three adaptations of several organisms after studying their pictures.
3. Interpret the functions or advantages of specific adaptations.
4. Distinguish between physical and behavioral adaptations and give examples of each.
5. Design a creature with specific adaptations to survive in a specific habitat.

PROCESS SKILLS USED IN THIS LESSON:

1. Recognizing adaptations of organisms.
2. Interpreting the functions or advantages of various adaptations.
3. Categorizing adaptations.
4. Communicating orally, pictorially, and in written form.
5. Inventing adaptations for an organism living in a specific area.

PREREQUISITE KNOWLEDGE FOR STUDENTS:

Words:

carnivore
herbivore
omnivore
organism
photosynthesis
pollination

BACKGROUND FOR TEACHERS:

1. An adaptation is a physical or behavioral characteristic of an organism which helps it to survive.
2. An adaptation can be either physical (affecting what the organism looks like) or behavioral (affecting how the organism acts).
3. Each habitat is suitable only to those life forms which have adapted, over a number of generations, to its ecological conditions.

4. Organisms adapt to their environment in ways that enable them to survive and maintain their numbers.
5. Species with very specific habitat requirements tend to be less able to adjust to environmental change.
6. By observing an organism, it is possible to explain or hypothesize the basis for adaptations. For example:

    - Mammals' hair keeps them warm.
    - An animal's color can act as camouflage.
    - A hawk's beak and talons are used for grabbing prey and tearing flesh.

PREPARATION FOR LESSON:

Materials for Students:

Student Worksheet 1, "Adaptability Activity" (II Pre 4, SW1)
Student Worksheet 2, "Creature Feature" (II Pre 4, SW2)
Student Handout, "Adaptations for Survival" (II Pre 4, SH)
Homework Assignment, "Adaptation Observation" (II Pre 4, HA)

Materials for Teachers:

Transparency A, "Rough-Legged Hawk" (II Pre 4, TA)
Transparency B, "Bird Adaptations" (II Pre 4, TB)
Answer Key to the Adaptability Activity (II Pre 4, SW1 AK)
Bird identification field guides
Overhead projector
Pictures of mammals and/or birds

INSTRUCTIONAL STRATEGY:

Teacher:

1. Display Transparency A, "Rough-Legged Hawk," to the class for five seconds. Then ask students to describe parts of the bird.
2. Show the transparency again. Have students provide additional descriptions. Ask, "What type of a beak does it have? How does this type of beak help the bird? Why? What kind of claws (talons) does it have? Why? What color are its feathers? What advantage might this color provide to the bird? How do feathers help the bird?" You may wish to record what students say.
3. Ask what would happen to this bird if it were missing a beak, a wing or claws.
4. Ask students to hypothesize what this bird eats and how it captures its food. Have them verify their responses by checking in a bird field guide.
5. Distribute Student Handout, "Adaptation for Survival," for students to read. Discuss the two major types of adaptations: physical and behavioral. Discuss the Environmental Survival Code.

6. Cover the right hand column (Environmental Survival Code) of Transparency B, "Bird Adaptations." Explain to students that birds have a variety of adaptations, including specific characteristics of beaks, feet, and coloration. If possible, show several bird pictures as examples. Ask students to determine the purpose of each adaptation listed on the transparency and select the appropriate letter in the Environmental Survival Code which corresponds to each adaptation. Check their answers by uncovering the right hand column.
7. Divide the class into small groups. Distribute Student Worksheet 1, "Adaptability Activity," to each group. Instruct groups to complete the worksheet. They should record the Environmental Survival Code or Codes for each statement, and indicate at the end of each statement whether the adaptation is physical (P), behavioral (B), or both (P and B).
8. After the groups have completed their worksheets, discuss the answers. (Use the "Answer Key to the Adaptability Activity.")

DISCUSSION QUESTIONS:

1. How have people, instead of adapting to their environment, changed their environment to accommodate their needs?
2. What happens to organisms that cannot adapt quickly enough to people's environmental changes? Why should we care about those organisms?

EVALUATION ACTIVITIES:

1. Ask students to define adaptation.
2. Show a picture of an animal. Ask students to identify several adaptations and describe how these adaptations benefit the animal. Then have them determine whether the adaptations are physical, behavioral, or both.
3. a. Brainstorm with students areas where animals might live (e.g., ocean, river, forest, desert, cave, field). Write responses on the board. Distribute Student Worksheet 2, "Creature Feature." Ask students to complete the worksheet by choosing an area where animals might live (written on the board), inventing a creature which could live there, and naming the adaptation features it would need to survive.
   b. After the worksheets are completed, students can present their inventions to the whole class or small groups. As students describe their creatures, have the class (or group members) guess where the creatures might live.

KEY TERMS:

adaptation (physical, behavioral)
camouflage
habitat
hypothesis
organism
predator

CAREER OPPORTUNITIES:

naturalist, biologist, ornithologist

TECHNOLOGICAL APPLICATIONS:

Technological advances reflect people's desire to expand their limited adaptations, allowing them to survive in many harsh environments. People have manipulated their environment to provide access to limited resources (e.g., water).

ETHICAL CONCERNS:

1. Most organisms have become extinct or are endangered because of habitat loss. They were/are not able to adapt fast enough to the changes which occurred or are occurring in their environment.
2. Animals do not have protective adaptations for poisons, guns, cars and other items produced by humans. In addition, native organisms usually do not have adaptations to compete with or protect themselves against non-native species (which were brought into the area by people) such as starlings, cattle, cats, dogs, etc.
3. Many scientists are concerned about extinction of organisms caused by human activities.

INTEGRATION WITH OTHER CURRICULAR AREAS:

1. Reading, writing, describing (language arts)
2. Drawing adaptations (art)
3. Working with others, discussing, and expressing ideas (social science)

HOME LEARNING SUGGESTIONS:

Have students do Homework Assignment, "Adaptation Observation."

EXTENSIONS:

1. Have students research California's state animals and plants and describe their adaptations.
2. Have students research endangered and extinct species and reasons for their predicament.
3. Do Project Wild's "Here Today, Gone Tomorrow," where students describe some causes for extinction of animals and name a list of endangered species in their area.

CURRICULUM REFERENCES:

Science Framework Addendum:

- Animals have adaptations that enable them to obtain and conserve food, oxygen, and water; excrete waste products; move; protect themselves against predators; minimize effects of extreme temperatures; reproduce; etc.

History-Social Science Framework:

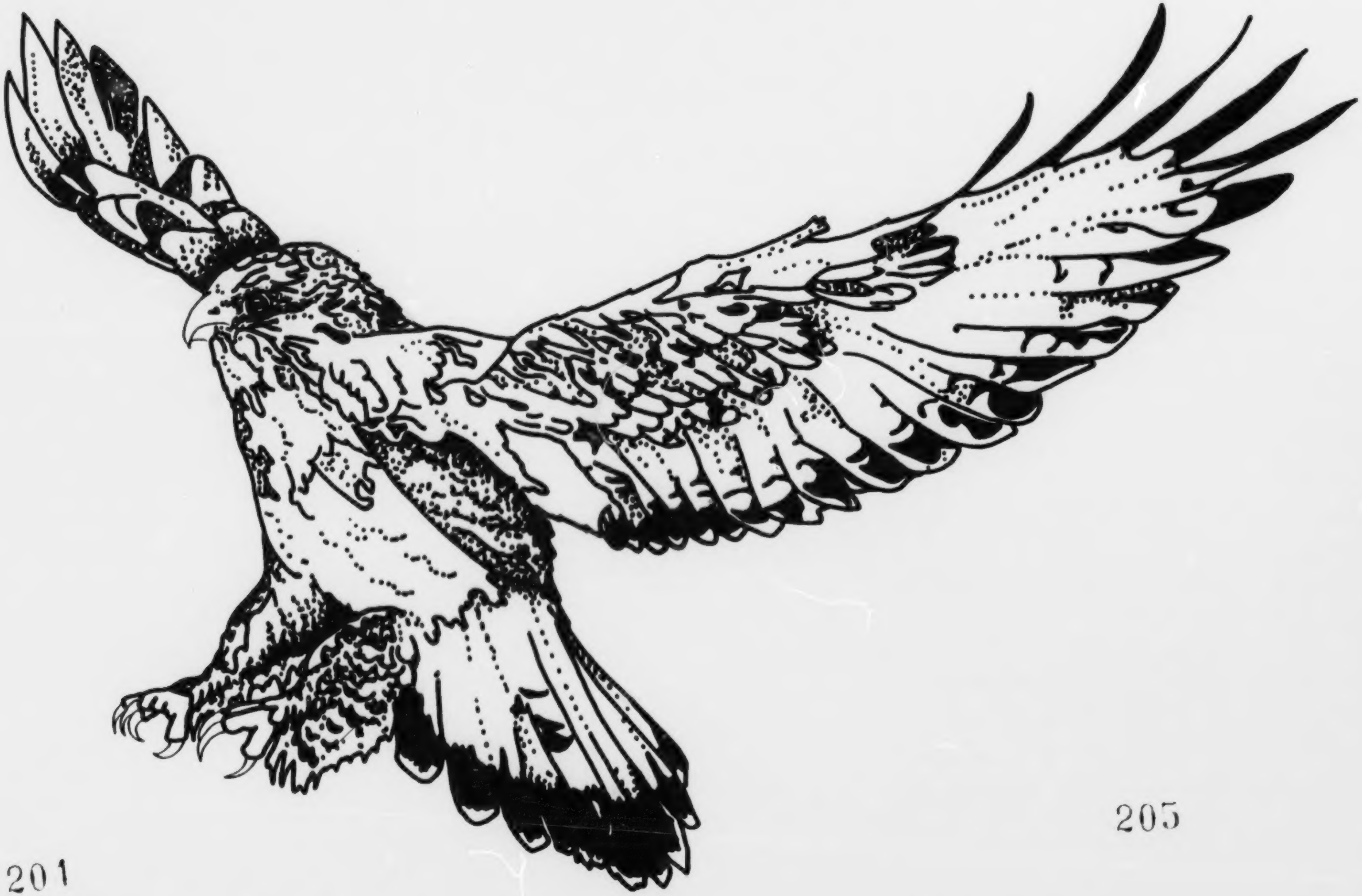
- Acquiring information by listening, observing, reading, etc.
- Organizing and expressing ideas in writing and speaking.
- Discussing and debating.
- Analyzing cause and effect.
- Developing group interacting skills.
- Reaching reasoned conclusions based on evidence.

Lesson Adapted from:

- Before You Go ... After You Return ... Classroom Activities to Expand the Outdoor School Experience.
- Santa Cruz County Resident Outdoor Education Teacher's Guide.
- Pre-Camp Curriculum Guide.
- "Adaptation Artistry," Project WILD.
- Monterey County Outdoor Education Program Teacher's Guide.

(II Pre 4, TA)

ROUGH-LEGGED HAWK



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(II Pre 4, TB)

BIRD ADAPTATIONS

ADAPTATION	BIRD	ADVANTAGE	ENVIRONMENTAL SURVIVAL CODE
BEAKS			
POUCH-LIKE	PELICAN	CAN CATCH AND HOLD FISH	A
LONG, THIN	GREAT BLUE HERON	CAN SPEAR FISH	A
POINTED	WOODPECKER	CAN PROBE BARK OF TREES FOR INSECTS; CAN PECK OUT HOLES	A, C
SHORT, THICK	FINCH	CAN CRACK SEEDS AND NUTS; CAN BUILD NESTS	A, C
SLENDER, LONG	HUMMINGBIRD	CAN PROBE FLOWERS FOR NECTAR; CAN BUILD NESTS	A, C
FEET			
WEBBED	DUCK	AIDS IN SWIMMING	A, B
THICK	CHICKEN, PHEASANT	AIDS IN WALKING AND RUNNING	A, B
CLAWED	HAWK, EAGLE	CAN GRASP FOOD WHEN HUNTING PREY	A
PERCHING	ROBIN	AIDS IN PERCHING	A
COLOR			
BRIGHT FEATHERS	MALE BIRDS	ATTRACTS FEMALE BIRDS	D
DULL FEATHERS	FEMALE BIRDS	AIDS IN CAMOUFLAGE WHILE NESTING	
SEASONAL COLOR CHANGE OF FEATHERS	SNOWY OWL, PTARMIGAN	PROVIDES CAMOUFLAGE FOR PROTECTION	B

11.99

ADAPTATIONS FOR SURVIVAL

On a road, you can observe many different types of vehicles. Some are small and compact, getting many miles to the gallon. Others are large and powerful, used for hauling heavy loads across great distances. Still more are colorful, sleek, and flashy, as if to show off the wealth of their owners. Every vehicle has certain characteristics, such as size, shape, and mechanical structure, which make it ideal for a specific purpose.

Like vehicles on the highway, every living thing possesses certain characteristics. However, the characteristics of living things are there to ensure their survival. These characteristics are called ADAPTATIONS, because they allow the organism to adapt to the many conditions of its environment. Adaptations can be either physical (affecting what the organism looks like) or behavioral (affecting how the organism acts). Both types of adaptations are responses to factors in the environment. For example, in a North Pole blizzard, an Arctic fox has a thick warm coat of fur to protect itself from the cold. It can also curl up into a tight ball to stay warmer. The warm coat is a physical adaptation, while curling up is a behavioral adaptation.

All adaptations are used by an organism for specific purposes, which we'll call:

THE ENVIRONMENTAL SURVIVAL CODE

Every living thing needs adaptations for the following in order to survive:

A. Animals must find food. Plants must capture light energy from the sun and obtain other food-building materials from air and soil to make their own food through photosynthesis.

B. Animals and plants must obtain water. Animals may travel to a water source. They may conserve water in their bodies by staying underground during the heat of the day, etc. Plants may have deep or spread out roots to acquire water. They may also have various coverings on leaves to keep water from evaporating too quickly.

C. Both animals and plants must avoid being captured and eaten by other organisms.

D. Animals must locate or create shelter to protect themselves from harsh environmental conditions. Plants must grow in certain habitats or have structures or characteristics which protect them.

E. Animals must find a mate to breed with and produce healthy young. Many plants must attract pollinators (insects, other animals) or depend on the wind to carry pollen from one plant to another to produce seeds.

II Pre 4, SW1

ADAPTABILITY ACTIVITY

Name: ________________________________

Below is a list of sentences describing the adaptations of many kinds of organisms. Think about the adaptations used by the underlined organism in each statement and assign each one an appropriate symbol (A, B, C, D, or E) from the Environmental Survival Code. More than one code could apply to a statement. The code is listed on the bottom of the handout "Adaptations for Survival." Also, at the end of each statement, write down whether the adaptation is physical (P), behavioral (B), or both (P and B).

Adaptability

____ 1) The fox has sharp teeth and a strong jaw. ____

____ 2) A plant in the shade has wide leaves. ____

____ 3) A brown moth is hard to spot against the rotting log. ____

____ 4) Minnows swim in large groups of many thousands of fish. ____

____ 5) The young deer stays completely still when its mother is away. ____

____ 6) The hermit crab finds a larger abandoned snail shell when it outgrows the one it lives in. ____

____ 7) Some flowers smell very fragrant, are brightly colored, and attract lots of bees. ____

____ 8) Human beings often stay with their parents for more than 20 years. ____

____ 9) A praying mantis looks like a green twig. ____

____ 10) A king snake looks almost like a poisonous coral snake. ____

____ 11) Blackberries taste delicious, but their seeds are hard and bitter. ____

____ 12) Many birds fly south for the winter. ____

____ 13) Walruses in Alaska and penguins at the South Pole have thick coats of blubber. ____

____ 14) The rooster has brightly colored feathers and a red comb on its head. ____

____ 15) Porcupine quills are barbed and very sharp. ____

____ 16) Frogs have sticky tongues that they can extend several inches from their mouths. ____

____ 17) Cactus plants have sharp spines. ____

____ 18) The eagle can spot small moving objects from hundreds of feet in the air. ____

____ 19) Starfish can locate and open clam shells. ____

____ 20) Small wildflowers bloom in early spring before the trees above them have leaves. ____

____ 21) Sagebrush has long roots which can grow down to 30 feet. ____

____ 22) Kangaroo rats do not have to drink water. ____

____ 23) Some animals travel for days to get to water. ____

ANSWER KEY TO THE ADAPTABILITY ACTIVITY (For teacher's use)

Note: As an extension to this activity, more examples of organisms which use the type of adaptation mentioned in each statement can be suggested by the class and discussed. At the end of each statement is a capital letter to indicate whether the adaptation is physical (P), behavioral (B) or both (P and B).

1) A Foxes and other members of the dog family (wolves, hyenas, coyotes) use their sharp teeth and muscular jaws to capture rodents, birds, and other small animals. (P)

2) A Plants in a shady area with the widest leaves would have the best chance of "capturing" sunlight in order to carry out photosynthesis. (P)

3) C Camouflage, avoiding capture by blending in with surroundings, is a very successful predator avoidance technique. (P and B)

4) C Large schools of fish are living testimony to the term "safety in numbers." The chance of being captured by predators is much slimmer in large groups, especially if you're one of the lucky ones in the middle of the group. This arrangement also facilitates getting together for breeding. (B)

5) C The "freeze" posture is used by many young animals. Many of their predators have limited color vision, which makes the young deer's mottled coat appear even less visible. Also, many young animals have no detectable odor. (B and P)

6) C,D The hermit crab's shell protects its soft body from sharp objects as well as sharp teeth! (B)

7) E Flowers are the most highly developed mating adaptations in the plant kingdom. Since plants can't move about, they have wind or other organisms do the work of transferring pollen for them. Many flowers are shaped and scented to attract only a certain species of insect pollinator. Some orchid flowers are shaped like female wasps--the ultimate attractant to males of the species! (P)

8) E Child-rearing is an adaptation for successful breeding of offspring, and is most pronounced in monkeys and humans. The pressures of living in human society demand that youngsters be taught the rules of society for many years before living away from parents. (B)

9) A,C A camouflaged praying mantis will remain motionless as it waits to capture prey and to avoid capture by larger animals. Some tropical mantids resemble flower petals. (P and B)

10) C Mimicry is a strategy used by many organisms to avoid capture by association. Potential predators see the bright stripes of the king snake in the same light as they view those of the coral snake--as a warning signal of a venomous animal. Viceroy butterflies mimic the bitter tasting Monarch butterfly. (P)

11) E Succulent fruit are eaten, seeds and all, by many animals. The tough, well-protected seeds pass through the animal's body and are deposited away from the parent plant, surrounded by a coat of fertilizer. This is an example of stationary organisms (plants) using mobile organisms as dispersal agents for their offspring. The burrs you take out of your socks after a run across a dry field are another. (P)

12) A,B,D Migration is a behavioral adaptation for seeking protection from harsh conditions. Many birds fly to milder climates where food is usually more abundant. (B)

13) D Blubber insulates sea mammals from cold water temperatures. (P)

14) E The males in many bird species have brightly colored feathers and complicated songs to attract mates. Female birds are generally drab, an adaptation for blending in with surroundings while caring for young at the nest. In bird species where both sexes share young-raising duties, the males are less colorful. One bird, the phalarope (pha - la - rope) switches roles. The pale whitish-brown male cares for the young, while the bright rust-colored female courts males at nests elsewhere! (P)

15) C Porcupine quills are barbed like fishhooks to prevent easy removal. Some predators learn to carefully turn a porcupine over, revealing its unprotected belly. (P)

16) A Frogs can open their mouths, extend their tongues, capture an insect, and return it to their awaiting mouths in less than 1/2 second! (P and B)

17) S These spines keep many animals from eating the plant. (P)

18) A,B Due to a denser arrangement of light-receptive cells in the back of its eye, the eagle's vision is many times more sensitive than that of humans. (P)

19) A A starfish can find clams. After opening the shell of a clam (or other shellfish), a starfish can extend its stomach into the shell cavity to digest its prey. (P and B)

20) A,E Small wildflowers can utilize the sun's energy to grow, flower, and produce seeds before plants above them shade them out. (P)

21) B Some plants have very deep roots to get to a water source. (P)

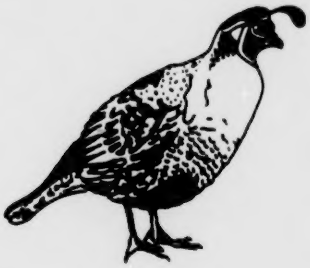
22) B A kangaroo rat's body can get enough moisture from seeds to survive without ever drinking water. (P)

23) B Some animals (especially in the dry areas in Africa) may travel for days to get to a source of water. In addition, these animals have adaptations (legs, wings, etc.) which allow them to travel to water. (B and P)

II Pre 4, HA

ADAPTATION OBSERVATION

Name: ____________________



1. List three adaptations that the California Quail has and the purpose of each adaptation:

Adaptation	**Purpose of the Adaptation** (find or capture food, avoid being captured, have protection from weather, to find a mate)
Example A: Feathers	Example A: To have protection from weather and to avoid being captured
a) ____________________	a) ____________________
b) ____________________	b) ____________________
c) ____________________	c) ____________________

2. Look at your pet, an animal in your yard, or one you saw on the way to or from school. Write down four adaptations it has. Indicate whether the adaptation is physical, behavioral, or both.

Adaptation	**Physical, Behavioral, or Both**
a) ____________________	____________________
b) ____________________	____________________
c) ____________________	____________________
d) ____________________	____________________

3. Look at a plant. Write down three adaptations it has and the purpose of the adaptations.

Adaptation	**Purpose of the Adaptation** (to capture light, avoid being eaten, have protection from weather, pollination)
a) ____________________	a) ____________________
b) ____________________	b) ____________________
c) ____________________	c) ____________________

CREATURE FEATURE

Name: ____________________

1. Write down the name of the area where your creature lives. __________
____

2. List three things that describe this area.

   a) ______________ b) ______________ c) ______________

3. Draw your creature here:

4. Answer the following questions about your creature:

   a. What adaptations does it have to find and capture food?
   ____
   ____

   b. How does it avoid being captured and eaten by other organisms?
   ____
   ____

   c. What type of shelter does it use to protect itself from harsh environmental conditions? ______________________________
   ____

Lesson 5

CREATING A POSITIVE EXPERIENCE

LESSON SUMMARY: Students identify their expectations of the resident outdoor school and role-play group living situations.

GOAL: To offer an opportunity to students to evaluate their thoughts and feelings about the upcoming resident outdoor school experience and identify group cooperation behaviors.

GRADE LEVEL: 5-7 **DURATION:** Two one-hour periods

LEARNING OBJECTIVES:

Upon completion of this lesson, students will be able to:

1. Identify what they hope to learn and see at the resident outdoor school.
2. Identify things they are excited about concerning the resident outdoor school.
3. Discuss some concerns they have about the resident outdoor school.
4. Commit to at least one personal action they will take to make the resident outdoor school experience a positive one for all concerned.
5. Discuss solutions to possible group living problems and identify group cooperation behaviors.

PROCESS SKILLS USED IN THIS LESSON:

- Communicating orally and in written form about expectations of the resident outdoor school.

PREREQUISITE KNOWLEDGE FOR STUDENTS:

It is recommended that students complete previous Pre-Outdoor School Activities before participating in this lesson.

BACKGROUND FOR TEACHERS:

Attend training sessions or workshops related to the resident outdoor school (if available).

Review handbooks from the resident outdoor school your class will be attending.

If you do not have access to outdoor school handbooks, consider the following goal usually associated with a resident outdoor school program: To develop in students a caring and respect for each other and the natural world by providing a program of direct experiences in the discovery of interrelationships and interdependence between themselves and their social and ecological environment. At the resident outdoor school, students will be participating in field studies, assuming their duties as members of the outdoor school community and practicing conservation (using resources wisely), cooperation (working together with others), and consideration (respecting others and the natural world).

PREPARATION FOR LESSON:

Materials for Students:

Student Worksheet, "Outdoor School Expectations" (II Pre 5, SW)

Materials for Teacher:

Transparency A, "For a Great Outdoor School Week" (II Pre 5, TA)

INSTRUCTIONAL STRATEGY:

1. Discuss with students things they might learn and do at the resident outdoor school, for example:
    a. Observe and study plants, animals, and nonliving things (air, water, soil, rocks, etc.) and their interrelationships.
    b. Use senses to find out more about different ecosystems (living things and their surroundings).
    c. Receive instruction regarding the protection and wise use of natural resources, significance of components in ecosystems, and people's dependency upon the natural environment.
    d. Participate in conservation practices (saving water, electricity, food, respect for living things).
    e. Assume duties as members of the outdoor school community (keeping cabins clean, helping during meals, etc.).
    f. Have opportunities to make new friends from other classes, schools, and cultures.
    g. Participate in recreational activities.
2. Distribute Student Worksheet, "Outdoor School Expectations."
    a. Ask students to complete the worksheet and be prepared to discuss it.
    b. Have students discuss their answers in small groups or with the entire class.
3. Have students role-play group living situations, problems, and possible solutions. Examples:
    a. Being helpful and considerate to others: sharing, taking turns, respecting the privacy and belongings of others.
    b. Asking for things politely.
    c. Displaying appropriate table manners.
    d. Sharing discoveries with others.
    e. Having a positive attitude, being enthusiastic about lessons as well as chores.
    f. Participating fully in all aspects of the resident outdoor school program.
    g. Keeping cabin and areas in and around the resident outdoor school clean.
    h. Making new friends; being friendly to all.
    i. Listening and following directions.
    j. Obeying all rules.
    k. Being safety conscious at all times.

4. Discuss what to do in situations such as the following: someone got injured, someone is being inconsiderate; you see someone breaking a rule; you are feeling left out.
5. Display Transparency A and discuss the meaning of the statements with the students.

DISCUSSION QUESTIONS:

1. How could the resident outdoor school provide experiences to help you develop appropriate citizenship skills (e.g., sportsmanship, fair play, sharing, taking turns, resolving disputes nationally, respecting the rights of others)?

2. What do you plan to do to make sure this resident outdoor school experience will be worthwhile to you?

EVALUATION ACTIVITIES:

Discuss with students:

1. What is the purpose of attending the resident outdoor school?
2. What are some guidelines which should be followed at the resident outdoor school?

KEY TERMS:

conservation
interrelationship

TECHNOLOGICAL APPLICATIONS:

A major trend in today's American society is high technology or "high tech." To compensate for the "high tech" intrusion into our lives, some people believe that counterbalance emphasizing personal involvement ("high touch") is essential. Affiliation with nature is seen as "high touch." Discuss this trend. How can "high tech" help us to understand nature?

ETHICAL CONCERNS:

1. Individual action can affect the whole group.
2. Respect for the earth and all its living things will enable people to live in harmony with one another and their environment.

INTEGRATION WITH OTHER CURRICULAR AREAS:

1. Writing, discussing (language arts)
2. Working with others, discussing and expressing ideas (social science)

HOME LEARNING SUGGESTIONS:

1. Ask students to share the Outdoor School Name Card with parents and discuss what the resident outdoor school may be like.
2. Have students ask parents what they hope their child will learn at the resident outdoor school. Students should write down their parents' expectations. These could be discussed in class.

EXTENSIONS:

1. One week before attending the resident outdoor school, bring a "mystery" item or picture of something that students might see there. Have a different item or picture every day. Display field guides and reference books to help them identify the mystery item. Ask students to write down what they think the item or picture is, along with their name. Examples: deer droppings, lichen, fungus, cloud formations, etc.
2. Do a lesson in nonverbal communication. Have students demonstrate nonverbally the following: friendliness to someone they don't know, cooperation in a cabin, interest in what is going on, boredom, unfriendliness to another person, etc.
3. Play games stressing group cooperation.
4. Have students write a letter home to their parents telling them about the upcoming trip and/or an invitation to meet an outdoor school staff member at an orientation meeting (if one is planned).

CURRICULUM REFERENCES:

History-Social Science Framework:

- Developing group interacting skills.
- Expressing ideas in writing and speaking.
- Becoming aware of the kinds of behaviors necessary for the functioning of a democratic society.
- Defining and clarifying problems.

LESSON ADAPTED FROM:

- Manure to Meadow to Milkshake.
- TOTE Project.
- Santa Cruz County Resident Outdoor Education Program Teacher's Guide.
- Monterey County Outdoor Education Program Teacher's Guide.
- Orange County Outdoor Science School Teacher's Guide.
- A Residential Outdoor Science School Handbook.

(II Pre 5, TA)

FOR A GREAT OUTDOOR SCHOOL WEEK REMEMBER:

I
AM
UNIQUE

I HAVE THE
PRIVILEGE
TO ENJOY AND LEARN AT THE RESIDENT OUTDOOR SCHOOL.
I WILL TAKE THE RESPONSIBILITY TO DO MY SHARE
OF WORK, COOPERATE WITH
OTHERS, AND SHOW
RESPECT FOR
THE NATURAL
WORLD.

I'LL
MAKE
THE
DIFFERENCE
WITH
ENTHUSIASM
AND
PARTICIPATION

I'LL
MAKE
NEW
FRIENDS
AND HAVE
A FUN AND
WONDERFUL
WEEK!

OUTDOOR SCHOOL EXPECTATIONS

NAME: ______________________________

1. Choose something in nature that you identify with most ________________

2. What things are easier to study outside than inside?

   ____

3. What two things do you hope to learn at the resident outdoor school?

   ____

   ____

4. What two things do you hope to see at the resident outdoor school?

   ____

   ____

5. What two things are you very excited about concerning the resident outdoor school?

   ____

   ____

6. What two things will you do personally to make the resident outdoor school experience a positive one for you and all participants?

   ____

   ____

7. What concerns or worries do you have about going to the resident outdoor school?

   ____

   ____

Lesson 6

NATURALLY GOOD MANNERS

- -

LESSON SUMMARY: Students discuss the importance of appropriate trail behaviors and develop a trail user code of ethics.

GENERAL GOAL: To provide guidelines for appropriate behavior on resident outdoor school trails, to encourage safe and active participation in learning activities, and to minimize negative impacts on the environment.

GRADE LEVEL: 5-7 **DURATION:** Two one-hour periods

LEARNING OBJECTIVES:

Upon completion of this lesson, students will be able to:

1. List major natural resources.
2. Observe an illustration and identify human activities which have a negative impact on the environment and on people.
3. Discuss reasons why appropriate trail behaviors are essential at the resident outdoor school.
4. Identify appropriate trail behaviors and classify them into three categories.
5. Discuss the natural resources which may be seen at the resident outdoor school.
6. Develop a personal trail user code of ethics.

PROCESS SKILLS USED IN THIS LESSON:

- o Communicating orally and pictorially trail behaviors considered to be appropriate.
- o Analyzing and classifying trail behaviors into categories.

PREREQUISITE KNOWLEDGE FOR STUDENTS:

Natural resources

BACKGROUND FOR TEACHERS:

1. Major natural resources needed by humans include air, water, soil, minerals, plants, animals, sources of energy, and areas of natural beauty.
2. Every individual has a responsibility for the quality of the environment.
3. Respect for the earth and all its living things will enable people to live in harmony with one another and with their environment.
4. In determining responsible and ethical actions in relation to our natural resources, individuals must separate desires from actual needs.
5. As population increases and/or as resource supplies decrease, the freedom of individuals to use resources as they wish decreases.

6. Every human activity has an effect on the environment. The need to weigh degrading activities against the benefits received becomes increasingly important as population and consumption levels rise.
7. Resource depletion and environmental degradation can be slowed by the adoption of alternative lifestyles and social expectations.
8. It is the responsibility of citizens (as well as government and industry) to avoid waste and destructive exploitation of natural resources.
9. Appropriate behaviors on resident outdoor school trails include:

   A. Respecting the environment around you.

   - Protect plant life. Leave plants in their natural condition.
   - Protect wildlife. Observe animals quietly and with respect. Leave nests and other animal homes in their original places.
   - Stay on the trail. This prevents erosion of areas outside the trail.
   - Leave only footprints; take only pictures and beautiful memories. Put litter in pockets or in a trash bag (empty into garbage can at the outdoor school). Leave natural objects in their places. Keep streams and other waterways clean.

   B. Respecting other people.

   - Follow directions.
   - Be courteous to others. For example: When hiking through brush, be careful to hold branches so that they don't strike the person following you. Watch that you don't step on people's heels. Listen to the leader and to fellow students.

   C. Be aware of safety.

   - Walk at all times.
   - Stay with the group.
   - Watch for low branches, loose rocks, etc.
   - Let the leader know immediately if you or someone else is injured.
   - Prevent fires.

Most resident outdoor school trail behavior can apply to all trails, including those at our state and national parks. Students should always hike with a partner and let an adult know where they are hiking and for how long.

PREPARATION FOR LESSON:

Materials for Students:

Student Worksheet, "Behavior on Trails" (II Pre 6, SW)
Paper and pencils
Colored pencils

Materials for Teacher:

Glass of water
Chalkboard
Transparency A, "People vs Nature" (II Pre 6, TA)
Transparency B, "Appropriate Behavior on Trails" (II Pre 6, TB)

INSTRUCTIONAL STRATEGY:

1. Show students a glass of water. Tell them that water is a natural resource. Ask students to identify other natural resources. (See Background for Teachers.)
2. Discuss what natural resources might be seen at the resident outdoor school.
3. Display Transparency A, "People vs Nature" illustration.
4. Ask students to study the illustration and identify eight to ten inappropriate outdoor behaviors. List these on the board and discuss their impact on the environment and on other people.
5. Tell students that at the resident outdoor school they will be walking on many trails to study various ecosystems and their associated plants and animals. Discuss the reasons why appropriate trail behaviors are essential at the outdoor school. (These could include: safety reasons; to protect natural resources including plants, animals, and their environment; and to allow other students to enjoy and study the natural areas.)
6. Have students think about and tell you what appropriate behaviors expected at school can apply to outdoor school trails (e.g., following directions, staying with the class or group, keeping hands and feet to oneself). List these on the board.
7. Brainstorm additional appropriate behaviors on trails. Lead students to include behaviors listed in Background for Teachers, #9. Write these on the board.
8. Distribute Student Worksheet, "Behavior on Trails." Ask students to categorize trail behaviors listed on the board by writing them under the proper heading.
9. Have students check their answers by comparing them to Transparency B, "Appropriate Behavior on Trails."
10. Divide the class into small groups. Ask them to develop a "Trail User Code of Ethics." This may be a list of rules, a statement, a pledge, etc.
11. Have groups share their code of ethics.

DISCUSSION QUESTIONS:

1. How might the environment at the resident outdoor school be different from the classroom?
2. What natural resources might we see on outdoor school trails?
3. Why do we want to protect our natural resources?
4. Why should we follow appropriate trail behaviors? What could happen if everyone followed inappropriate behaviors?
5. What trail behaviors would be appropriate when we are hiking in national forests, parks, etc.?
6. What are some potential natural hazards that we should be aware of at the outdoor school? What safety precautions should we follow? Examples:
   - o bodies of water (emphasize the "Buddy" system)
   - o dangerous trails (discuss trail manners)
   - o unusual weather conditions (plan appropriate clothes)
   - o poisonous insects, reptiles, and/or plants (discuss ways to minimize danger)

4. Do Project WILD's "Ethi-Thinking," where students evaluate outdoor activities which are harmful to the environment and recommend alternatives.
5. Do Project Learning Tree's "Outdoor Manners Coloring Book," where students illustrate appropriate outdoor manners.

CURRICULUM REFERENCES:

Science Framework Addendum:

- The effect on other populations needs to be considered along with other costs and benefits when human activities that affect the environment are evaluated.
- Conservation of resources is an ethical concern of individuals and societies.

History-Social Science Framework:

- Developing group interacting skills.
- Understanding human and environmental interactions.
- Reaching reasoned conclusions based on evidence.
- Organizing and expressing ideas in writing and speaking.
- Developing a keen sense of ethics and citizenship.
- Understanding individual responsibility.

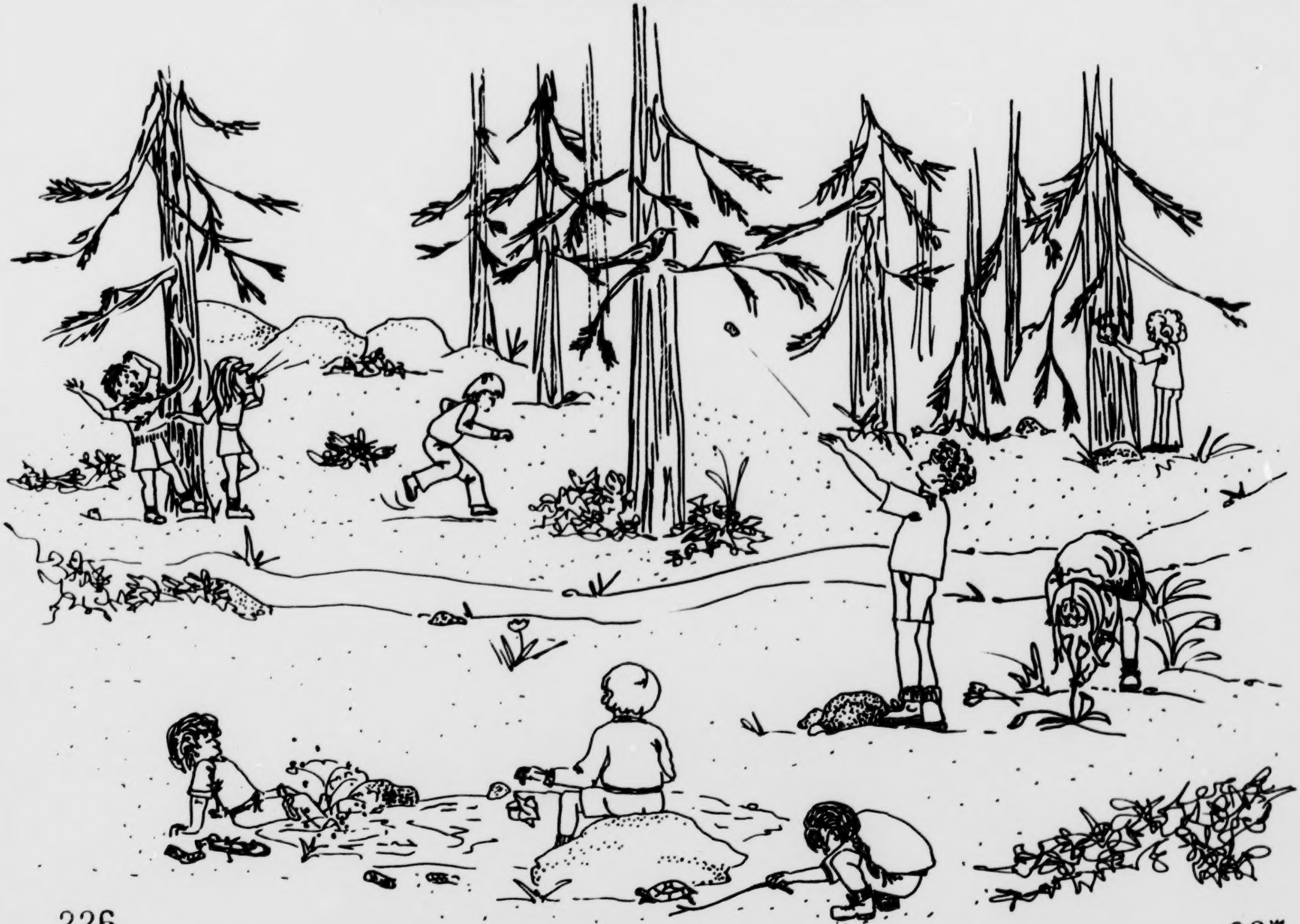
LESSON ADAPTED FROM:

Monterey County Outdoor Education Program Teacher's Guide.

(II Pre 6, TA)

PEOPLE VERSUS NATURE

II.117



BEHAVIOR ON TRAILS

RESPECTING THE ENVIRONMENT	RESPECTING OTHER PEOPLE	SAFETY

APPROPRIATE BEHAVIOR ON OUTDOOR SCHOOL TRAILS

RESPECTING THE ENVIRONMENT	RESPECTING OTHER PEOPLE	SAFETY

(II PRE 6, TB)

BEHAVIOR ON TRAILS

RESPECTING THE ENVIRONMENT	RESPECTING OTHER PEOPLE	SAFETY
PROTECT PLANT LIFE: • **LEAVE PLANTS IN THEIR NATURAL CONDITION.** PROTECT WILDLIFE: • **OBSERVE ANIMALS QUIETLY AND WITH RESPECT.** • **LEAVE NESTS AND OTHER ANIMAL HOMES IN THEIR ORIGINAL PLACES.** STAY ON TRAILS TO PREVENT EROSION. LEAVE ONLY FOOTPRINTS; TAKE ONLY PICTURES AND BEAUTIFUL MEMORIES: • **PUT LITTER IN POCKETS OR IN TRASH BAGS.** • **LEAVE NATURAL OBJECTS IN THEIR PLACES.** • **KEEP STREAMS AND OTHER WATERWAYS CLEAN.**	FOLLOW DIRECTIONS. BE COURTEOUS TO OTHERS: • **HOLD BRANCHES SO THEY DON'T HIT THE PERSON BEHIND YOU.** • **WATCH THAT YOU DON'T STEP ON THE HEELS OF THE PERSON IN FRONT OF YOU.** • **LISTEN TO THE LEADER AND TO FELLOW STUDENTS.**	WALK AT ALL TIMES. STAY WITH THE GROUP. WATCH FOR LOW BRANCHES, LOOSE ROCKS, ETC. PREVENT FIRES. LET THE LEADER KNOW IMMEDIATELY IF YOU OR SOMEONE ELSE IS INJURED.

11.120

CHAPTER 3

POST-OUTDOOR SCHOOL ACTIVITIES

In this chapter, five lessons have been designed for classroom teachers to implement after their classes attend a residential outdoor school. As with the pre-outdoor school lessons, the concepts for the post-outdoor school lessons were based on recommendations by members of California Outdoor School Administrators (COSA). Activities were chosen and revised from outdoor school handbooks for teachers and from other environmental/outdoor education publications. References are located at the end of this guide.

PURPOSE OF THE LESSONS

The purpose of the Post-Outdoor School Activities is to reinforce concepts studied at the outdoor school. Students will evaluate their outdoor school experience, apply knowledge gained at the outdoor school, and participate in school improvement projects.

The lessons are in the recommended order of use:

Lesson 1, Outdoor School Memories
Lesson 2, Here and There
Lesson 3, There's No Place Like Home
Lesson 4, Campus Care -- Show and Tell
Lesson 5, Rewind, Play, and Fast Forward

Lesson 1

OUTDOOR SCHOOL MEMORIES

- -

LESSON SUMMARY: Students evaluate and record their resident outdoor school experiences in a journal and create a newsletter.

GOAL: To reinforce positive experiences at the resident outdoor school using various communication skills.

GRADE LEVEL: 5-7 **DURATION:** Two one-hour periods

LEARNING OBJECTIVES:

Upon completion of this lesson, students will be able to:

1. Describe positive experiences which occurred at the resident outdoor school.
2. State their favorite educational activity at the outdoor school.
3. Design an outdoor school newsletter which reflects their observations, experiences, thoughts, and feelings.

PROCESS SKILLS USED IN THIS LESSON:

- Communicating orally and in writing observations and experiences at the resident outdoor school.

PREPARATION FOR LESSON:

Materials for Students:

Journals (or pages to write and draw on)
Recycled paper (for thank you cards)
Construction paper (for thank you cards)
Felt tip pens or crayons
Glue

Materials for Teacher:

Chalkboard
Outdoor school schedules and list of activities

Management Suggestions:

When doing the "memory circle," choose a leader (or use an aide) in the groups that you are not in to help the activity along. The activity could also be done with a selected group of students while others observe.

INSTRUCTIONAL STRATEGY:

1. Ask students to brainstorm activities which occurred at the resident outdoor school. List these on the board. Examples: cabin living, hikes, science investigations, night walk. If necessary, use an outdoor school schedule to refresh students' memories.
2. Instruct students to select several activities from the list on the board to write about in their journals. For each selected activity, students should describe and evaluate their experiences.
3. When all students have completed writing, do a "memory circle" activity. Separate students into two groups. Ask each group to form a circle. Each group will participate in the same activity. The first student (in each circle) states his/her favorite educational activity at the outdoor school. A reason why it was the favorite can also be given. The second student repeats what the first student said, then states his/her own answer. The third student repeats the statements of the first and second students then says his/her own. Continue this procedure around the circle. The first student has to repeat the answers given by the students in the entire circle. Students can help one another, as needed. Discuss what answers were given most often and the reasons for this.
4. Review the worksheet completed in Pre-Outdoor School Lesson 5, "Creating a Positive Experience," and lead a discussion to compare the actual experience to what was predicted.
5. Have students create an outdoor school newsletter. Organize committees to design the newsletter including: writers, illustrators, picture coordinators (to collect pictures taken at the outdoor school), and editors. Each student should be responsible for a portion of the newsletter. Newsletter items can include: stories, poems, essays, and reports; descriptions, pictures, and illustrations of outdoor school activities; information on ecosystems; hypothetical interviews of animals and plants; cartoons; special thanks; letters to the editor; and crossword puzzles or word searches of ecological terms. Newsletters could be sent to: outdoor school staff, administrators, parents, and classes which will be attending the outdoor school in the future.

CAREER OPPORTUNITIES:

writer, outdoor school staff member

INTEGRATION WITH OTHER CURRICULAR AREAS:

1. Writing in a journal (language arts)
2. Working with others, discussing and expressing ideas (social science)

HOME LEARNING SUGGESTIONS:

Ask students to discuss their journals and share the newsletter with family members.

EXTENSIONS:

1. Have each student write a thank you note to the outdoor school staff. The letter could include favorite educational experiences at, and special memories about, the resident outdoor school.

2. Report on the week's experience at the outdoor school to other classes and to the PTA or other organizations.
3. Prepare a slide show or portray the outdoor school story in pictures taken at the outdoor school.

CURRICULUM REFERENCES:

History - Social Science Framework:

- o Acquiring information by listening, observing, reading, etc.
- o Organizing and expressing ideas clearly in writing and speaking.
- o Planning, organizing and taking action in a group setting.

LESSON ADAPTED FROM:

- o "Memory Circle," Project Learning Tree.
- o Orange County Outdoor Science School Teacher's Guide.
- o Santa Cruz County Resident Outdoor Education Program Teacher's Guide.
- o Before You Go ... After You Return, Classroom Activities to Expand the Outdoor School Experience.

POST-OUTDOOR SCHOOL ACTIVITIES

Lesson 2

HERE AND THERE

- -

LESSON SUMMARY: Students observe and compare environments on school grounds and contrast one of these to the outdoor school environment.

GOAL: To understand that every environment has its characteristic life forms.

GRADE LEVEL: 5-7 **DURATION:** Two one-hour periods

LEARNING OBJECTIVES:

Upon completion of this lesson, students will be able to:

1. Locate wildlife and evidences of wildlife in the classroom and outdoors.
2. Compare two or three different environments and their associated animals on the school grounds.
3. Infer how animals found in the area meet their basic needs.
4. Compare school ground environments to the outdoor school environment.

PROCESS SKILLS USED IN THIS LESSON:

1. Predicting what may be found in different environments.
2. Observing areas on the school grounds.
3. Communicating orally and in written form.
4. Comparing different environments and associated animals.
5. Generalizing about characteristic life forms associated with various environments.
6. Analyzing the needs of the animals and recognizing how these needs are met.

BACKGROUND FOR TEACHERS:

1. Wildlife includes all animals not domesticated by people: microscopic animals, insects, spiders, fish, birds, mammals, reptiles, and amphibians.
2. People and wildlife share environments.
3. Wildlife exists in nearly all areas of our planet.
4. Every environment has its characteristic life form.
5. Wildlife serves as an important indicator of the overall health of a specific environment. If there are few animals (or little evidence of wildlife) present in an area, it is likely that there is little available food, water, or shelter.
6. Certain animals have adapted well to people's changes of the environment including flies, rats, cockroaches, pigeons, starlings, and English sparrows.

PREPARATION FOR LESSON:

Materials for Students (one for each group):

Clipboard or cardboard to write on
Pencils
Student Worksheet 1, "School Grounds Data" (II Post 2, SW1 & TA)
Student Worksheet 2, "Comparing School Grounds and the Outdoor School Environment" (II Post 2, SW2)

Materials for Teacher:

Chalkboard
Transparency A, "School Grounds Data" (II Post 2, SW1 & TA)

Management Suggestions:

When outdoors, set up boundaries for students.
Ask students to follow rules which applied to outdoor school trails.

INSTRUCTIONAL STRATEGY:

1. Ask students to give examples of wildlife. (See Background for Teachers.)
2. Instruct students to explore the classroom looking for wildlife and signs of wildlife for 2-3 minutes without disturbing the signs. Discuss evidences found and write these on the board. Discuss what areas or evidences might have been overlooked (e.g., spider webs). Allow students a few more minutes to find additional evidences of wildlife and add these to the list on the board. Tell students that we often share our environment with wildlife, even though we do not always notice their presence.
3. Tell students that they will have an opportunity to observe and compare environments and types of animals which live on school grounds. Later, they will compare their school grounds to the outdoor school environment.
4. Separate students into six groups. Each group will be responsible for exploring and recording information on three areas on the school grounds:
   a. a bare area (blacktop or cement)
   b. a human-planted area (lawn, bushes)
   c. a wild area (field, around fences, etc.). If no "wild" areas are present, have students collect data on only two areas.
5. Distribute Student Worksheet 1 to each group, and ask students to write down their predictions on what they think they might find in each of the three areas.
6. Discuss how to properly complete the worksheet. Students will be describing each area studied, listing animals (or evidences of animals) found. If many animals of one type are present, they should tally or estimate their numbers. Finally, they will be looking for things in each area which supply the basic needs of animals found there: oxygen, food, water, space, and the proper arrangement of these.
7. Take the class out-of-doors. Describe the boundaries. Have students gather data.

8. Back in the classroom ask students to report their findings as you record the information on Transparency A.
9. Discuss the following:
   - o Which area had the most animals and/or evidences of animals: bare, human-planted, or wild areas? Why?
   - o Which area contained the least amount of basic needs required by animals? Where might the animals go to find their needs?
   - o How are the animals found in each area adapted to that environment?
   - o How have people affected the school grounds environment?
10. Divide students into small groups. Have each group select one schoolground environment and compare it to one found at the outdoor school by completing Student Worksheet 2. Groups should choose a specific natural outdoor school environment such as pine forest, chaparral, or meadow.
11. Ask groups to share the information on their worksheets with the class.
12. Discuss the following:
   - o How is the outdoor school environment different from the school grounds?
   - o How are they similar?
   - o What conclusions can we make about each environment?
   - o What is meant by the statement, "Wildlife serves as an important indicator of the health of the environment?"

EVALUATION ACTIVITIES:

Review worksheets.

KEY TERMS:

adaptation	habitat
environment	wildlife

CAREER OPPORTUNITIES:

wildlife biologists

TECHNOLOGICAL APPLICATIONS:

Our technological society has decreased the habitats of many species of organisms. The urban sprawl and agriculture's dependence on monocultures have drastically reduced the variety of wildlife in many areas.

ETHICAL CONCERNS:

1. All activities of people have an impact on wildlife.
2. People have affected habitats of wildlife to the point that some wildlife is becoming endangered and extinct.
3. The effect on wildlife populations needs to be considered, along with other costs and benefits, when human activities that affect the environment are evaluated.

INTEGRATION WITH OTHER CURRICULAR AREAS:

1. Writing and communicating verbally (language arts)
2. Working with others, discussing and expressing ideas (social science)

HOME LEARNING SUGGESTIONS:

Have students survey their homes, yards, and/or neighborhoods for wildlife and evidence of wildlife.

EXTENSIONS:

1. Assign study areas on school grounds to small groups. Have groups design "study trails" through their areas. Have groups draw a map of the study trail, name the trail, and determine their point of interest stops. Each student should write a description for at least one stop. Groups can lead one another on their study trails.
2. Do Project Learning Tree's "I'd Like to Visit a Place Where...," where students describe their ideal recreation area.
3. Do Project Learning Tree's "With or Without," where students describe how trees make life more pleasant for people and wildlife.

CURRICULUM REFERENCES:

Science Framework Addendum:

- The application of science and technology to solve human problems can create other problems.
- Animals have adaptations.
- Population sizes are subject to limitations imposed by space, food supply, predators, and the destruction of habitats by natural disasters or human activity.

History - Social Science Framework:

- Developing group interacting skills.
- Obtaining information.
- Analyzing cause and effect.
- Reaching reasoned conclusions based on evidence.
- Understanding human and environmental interactions.

LESSON ADAPTED FROM:

"Wildlife Is Everywhere," "Environmental Barometer," and "Urban Nature Search," Project WILD.

(II Post 2, SWI & TA)

SCHOOL GROUNDS DATA

GROUP____________________ NAMES____

____

	BARE AREA (BLACKTOP OR CEMENT)	HUMAN-PLANTED AREA (LAWN, BUSHES)	WILD AREA (FIELD, AREA AROUND FENCES)
YOUR PREDICTIONS (WHAT YOU THINK YOU WILL FIND)			
DESCRIPTION OF AREA			
ANIMALS (OR EVIDENCES OF ANIMALS) SEEN			
HOW ARE THE BASIC NEEDS OF THE ANIMALS MET? (FOOD, WATER, SHELTER, SPACE)			

(II Post 2, SW2)

COMPARING SCHOOL GROUNDS AND THE OUTDOOR SCHOOL ENVIRONMENT

GROUP ____________________ **NAMES** ____

____

	OUTDOOR SCHOOL ENVIRONMENT	SCHOOL GROUNDS
TYPE OF ENVIRONMENT (FOREST, LAWN AREA, MEADOW, ETC.)		
ANIMALS FOUND THERE		
HOW BASIC NEEDS ARE MET		
CONCLUSIONS		

POST-OUTDOOR SCHOOL ACTIVITIES

Lesson 3

THERE'S NO PLACE LIKE HOME

- -

LESSON SUMMARY: Students design a mural of a forest ecosystem and determine the positive and negative consequences of various human influences on the forest.

GOAL: To develop an understanding of how humans can affect a forest ecosystem.

GRADE LEVEL: 5-7 **DURATION:** Two one-hour periods

LEARNING OBJECTIVES:

Upon completion of this lesson, students will be able to:

1. List and draw components of a forest ecosystem.
2. Give examples of, and choose sites for, several human activities and objects which could be introduced into the forest ecosystem.
3. Justify why specific locations were chosen for certain human activities.
4. List the positive and negative consequences of various human influences in a forest ecosystem.
5. Determine which human actions may be compatible with each other and with the environment.
6. Give examples of how changes in an ecosystem directly or indirectly affect wildlife and plants living there.
7. Describe how they can minimize negative environmental impacts while participating in an activity in a forest.

PROCESS SKILLS USED IN THIS LESSON:

1. Communicating orally, pictorially and in written form.
2. Generalizing the effect of various human actions on a forest ecosystem.
3. Comparing human activities which are beneficial to humans to ones which are beneficial to the environment.
4. Analyzing problems associated with habitat destruction and offering some solutions.

PREREQUISITE KNOWLEDGE FOR STUDENTS:

Components of a habitat and an ecosystem.

BACKGROUND FOR TEACHERS:

1. A habitat is an area where a plant or animal naturally grows or lives.
2. An ecosystem consists of a community of living things interacting with one another and with the physical environment.
3. Webster's Third New International Dictionary defines a forest as a dense growth of trees and underbrush covering a large tract of land; an extensive plant community of shrubs and trees in all stages of growth.

4. Forests are used by people in many ways. Some uses are compatible with each other, whereas other uses may be temporarily or permanently incompatible. In addition, some uses may be compatible with the forest ecosystem, whereas others create a negative environmental impact.
5. Loss and degradation of habitat is considered the greatest problem facing wildlife today.
6. Every change in the environment has consequences on living things.
7. As people change an environment, the suitability of the resulting environment for the survival of living things may be altered.
8. Decisions involving forests (and other natural resources) should take into consideration economic and environmental trade-offs.
9. The responsibility for forest conservation should be shared by everyone.
10. People use planning and zoning methods to define and adjust land use because some land or human uses exclude others, while some can co-exist.

PREPARATION FOR LESSON:

Materials for Students:

Six large pieces of butcher paper (one for each group)
Felt tip pens
Dictionary
Field guides on animals and/or encyclopedias

Materials for Teachers:

Chalkboard
Piece of butcher paper or transparency to write student responses on
Masking Tape
Human Activities Sheet
Transparency A, "Human Activities and Consequences (II Post 3, TA)
Teacher Information Sheet, "Human Influences and Consequences" (II Post 3, TIS)
Teacher Page, "Human Influences Sheet" (II Post 3, TP)

INSTRUCTIONAL STRATEGY:

1. Have students brainstorm a definition of a forest. Then ask them to locate the definition in a dictionary.
2. Tell students that they will be drawing a mural representing a forest ecosystem. Human influences will be omitted at this time. Ask students what components are usually present in an ecosystem and write their responses on the board--for example, living organisms including plants (producers), animals (consumers) which represent food chains and webs (herbivores, carnivores, omnivores, scavengers, decomposers) and nonliving things such as the sun, soil, water, rocks, etc.
3. Divide students into six groups. Distribute butcher paper, pencils and felt tip pens. Field guides on animals and encyclopedias should be accessible. Instruct each group to create a forest ecosystem by including all components listed on the board. The forest should be similar to one they studied at the outdoor school.
4. Have each group present their murals and indicate the parts of the forest ecosystem. Other groups can study the presenters' artwork to determine whether all components were included.

5. Brainstorm with students possible human influences such as fishing, hiking and/or developments (housing tracts, roads) which might be introduced into the forest ecosystem. Write these on the board.
6. Cut up the Human Influences Sheet (you can add to it or make your own list) and distribute two or three human influences to each group. Instruct groups to choose a location on their murals for the activities and/or developments and be prepared to explain why the particular locations were chosen. Each group must list the consequences (beneficial and nonbeneficial) of each human influence to people as well as to the total ecosystem.
7. As groups report to the class, list positive and negative consequences of each human influence on Transparency A. Use the Teacher Information Sheet, "Human Influences and Consequences," to add to students' list, as needed.
8. Discuss with students:
   - Were your human influences compatible or incompatible with each other? Why or why not?
   - Which activity or development could be the most damaging to the ecosystem? Which could be the least damaging?
   - How could some of the negative consequences be eliminated or at least have their impact to the environment lessened?
   - Should people be allowed to build whatever they want any place they want if they own the land? Why or why not? Land can be zoned for specific purposes, e.g., agriculture, forestry, open space, residential use, commercial use, etc. How can zoning be important for people, plants, wildlife, and the environment?
   - Many plants and animals have become extinct in the past 50 years, often as a result of habitat loss. How can we help endangered species from becoming extinct?

EVALUATION ACTIVITIES:

1. Instruct students to list five human activities which could take place in a forest and have them write down two positive and two negative consequences for each.
2. Have students list the two or three human influences in the forest ecosystem their group designed and describe in writing how each could affect an animal or a population of animals living there. Then have students write a story about the animal or animals.
3. Ask students to write an essay on which human activity in the forest they would participate in and how they would keep the negative consequences to a minimum.

KEY TERMS:

carnivore
consumers
decomposer
ecosystem
endangered
environment
extinct
forest
habitat
herbivore
omnivore
population
producer
scavenger

CAREER OPPORTUNITIES:

land use planner, wildlife biologist, forest manager

TECHNOLOGICAL APPLICATIONS:

Increasing human populations and technologies often require space and activities which are detrimental to our natural resources, including those found in forests. However, we can apply our technological knowledge to solve some of our environmental problems, such as pollution, population, habitat destruction, poverty, etc.

ETHICAL CONCERNS:

1. People can and are affecting forest ecosystems by using forest products and developing forest land.
2. A large percentage of forests in the eastern U.S. have been eliminated.
3. Some scientists fear that the cutting of tropical forests in South America may affect weather patterns.
4. Decisions will need to be made to determine the importance of forest conservation, habitat preservation, and the use of forest resources by people.

INTEGRATION WITH OTHER CURRICULAR AREAS:

1. Illustrating a forest ecosystem (art)
2. Communicating orally and in written form (language arts)
3. Working with others, discussing and expressing ideas (social science)

HOME LEARNING SUGGESTIONS:

1. Have students observe areas where wildlife and people co-exist and write an essay on them.
2. Ask students to develop a list of actions they can take to invite wildlife into their backyard and/or school. Then have them design a plan to implement their ideas.

EXTENSIONS:

1. Have students role-play various community members and their input on what should be done to the forested properties they designed. Then have everyone vote on which recommendation was: the most feasible; was the most expensive; had the least negative impact on the environment; would be most beneficial to the community; etc.
2. Do Project Wild's "To Zone or Not to Zone," where students role play a meeting of a county commission pertaining to a land-use issue.
3. Do Project Wild's "Migration Barriers," where students analyze the impact on wildlife migration patterns as a result of human activities.
4. Do Project Wild's "Ethi-Reasoning," where students discuss and make judgments about hypothetical dilemmas concerning wildlife and/or natural resources.
5. Do Project Wild's "Enviro-Ethics," where students develop a "Personal Code of Environmental Ethics."
6. Do Project Learning Tree's "My Use or Your Use or Our Use," where students describe implications of using a plot of land for a specific purpose by participating in a role-playing situation.

CURRICULUM REFERENCES:

Science Framework Addendum:

- Each species needs a particular physical environment.
- The effect on other populations needs to be considered along with other costs and benefits when human activities that affect the environment are evaluated.

History-Social Science Framework:

- Developing group interacting skills.
- Acquiring information by listening, observing, reading, etc.
- Analyzing problems and reaching conclusions based on evidence.
- Analyzing cause and effect.

LESSON ADAPTED FROM:

"Forest Consequences," Project Learning Tree.

HUMAN INFLUENCES SHEET

LOGGING AND LUMBER MILL	ROADS
FENCES	SEWAGE TREATMENT PLANT
TELEPHONE AND POWER LINES	HUNTING
FISHING	DAM/RESERVOIR
SKI AREA	CAMPGROUND (CAMPING)
HOUSING TRACT	RESORT
OUTDOOR SCHOOL	DUMP SITE
OFF-ROAD VEHICLE TRAILS	PICNIC AREA AND PARK

(II Post 3, TA)

HUMAN ACTIVITIES AND CONSEQUENCES

HUMAN INFLUENCE	POSSIBLE CONSEQUENCES	
	POSITIVE	NEGATIVE

HUMAN INFLUENCES AND CONSEQUENCES

Activity on Objects	Possible Consequences	
	Positive	Negative
Logging and Lumber Mill	Work for people Open up areas for edge effect (where two environments meet) Wood for people for houses, heating, furniture, fences, etc.	Fewer trees (food and shelter for animals) Possible erosion Possible silting of waterways Considered ugly by most people Noise and air pollution Habitat destruction
Roads	Allow people to travel Access to the forest for various activities including recreation	Fewer trees Possible erosion Habitat destruction Noise and air pollution by cars
Fences	Keep stock from escaping Food for people Keep stock in one area to avoid competition with wildlife (depending on location)	Stock overgraze, depleting the fertility of soil May cause erosion May compete with wildlife Cows might pollute water Fence might interfere with wildlife migration
Sewage Treatment Plant	May keep waterways from becoming polluted Provides a place for people's wastes May keep diseases from spreading	Fewer trees Habitat destruction May pollute waterways certain time of year
Telephone and Power Lines	Allow people to communicate and receive electrical power	Fewer trees Habitat destruction Considered ugly by most people Power lines could electricute certain birds if precautions not taken
Hunting	Recreation for people Food for people May keep certain animals from over-populating	Nongame species may get shot Animal may be injured, but not killed Sometimes only big, strong game is shot Poaching Litter

Activity on Objects	Possible Consequences	
	Positive	Negative
Fishing	Recreation for people Food	Illegal limit and/or size May create fish population shortages Litter
Dam/Reservoir	Recreation Water for people Water for agriculture Water for animals	Habitat destruction Erosion
Ski Area	Recreation Jobs	Habitat destruction Erosion
Campgrounds	Recreation	Habitat destruction Litter Fire hazards
Housing Track	Place for people to live	Habitat destruction Possible air, land, and water pollution
Resort	Recreation Rest and rejuvenation for people	Habitat destruction Possible air, land and water pollution
Outdoor School	Education about the environment People's enjoyment	Habitat destruction
Dump Site	Provides a place for people's garbage	Possible ground water contamination Pollution of land Health hazard Attracts animals that eat garbage
Off Road Vehicle Trails	Recreation Access to fishing, hunting, camping Enjoyment of ride	Habitat destruction Erosion Noise and air pollution Soil compaction
Picnic Area and Park	Place for people to picnic and enjoy the forest	Soil compaction Habitat destruction Litter

POST-OUTDOOR SCHOOL ACTIVITIES

Lesson 4

CAMPUS CARE -- SHOW AND TELL

LESSON SUMMARY: Students identify ways they could improve their school site and develop a plan to implement these improvements.

GOAL: To provide an opportunity for students to participate in a school site improvement project.

GRADE LEVEL: 5-7

DURATION: Three one-hour periods or more depending on the project

LEARNING OBJECTIVES:

Upon completion of this lesson, students will be able to:

1. Assess their school grounds for ways to improve the environment.
2. Suggest and evaluate means by which to either solve the problems and/or improve the situations.
3. Outline a plan for one feasible school site improvement project.
4. Implement the plan and evaluate the results.
5. Evaluate their thoughts and feelings about their participation in the project.

PROCESS SKILLS USED IN THIS LESSON:

1. Observing and analyzing the school grounds for potential improvement projects.
2. Communicating orally and in writing.
3. Gathering data on the school grounds.
4. Analyzing the feasibility of each improvement.
5. Solving a problem by implementing a school site improvement plan and evaluating results.

BACKGROUND FOR TEACHERS:

1. People are the only species which can consciously change environment.
2. Beneficial changes in the environment occur when people act together to promote human dignity.

Recommendation: Discuss with your administrator(s) the class's school improvement project and the possibility of implementing it.

PREPARATION FOR LESSON:

Materials for Students:

One per group:
- Student Worksheet, "School Ground Assessment" (II Post 4, SW)
- Homework Assignment, "Environmental Inspection" (II Post 4, HA)
- Clipboards (or pieces of cardboard)
- Paper
- Pencil

Materials for Teacher:

Chalkboard

Management Suggestions:

Have students follow "Outdoor Rules":
1. Stay within designated boundaries.
2. Collect data quickly and return to the classroom.

INSTRUCTIONAL STRATEGY:

1. Ask students to draw a map of their ideal school site and describe the grounds. This can be done individually or in small groups.
2. Discuss with students what components on the "ideal" school ground were included and list these on the board.
3. Brainstorm possible environmental problems and/or needs that students have noticed on their own school grounds: e.g., erosion, litter, poor drainage, trampled areas, need for trees or shrubs, etc., and list these on the board. You may need to walk the grounds with your class to locate the problem areas. Discuss why some of these problems exist.
4. Divide class into small groups. Assign to each group one problem on the school grounds to investigate.
5. Distribute Student Worksheets (one to each group) and ask groups to complete question #1.
6. Distribute clipboards (one to each group). Instruct groups to go outside, evaluate their assigned problems, and complete questions #2, 3, and 4 on their worksheets. Allow 15-20 minutes for this.
7. Back in the classroom, have students complete question #5 and report their proposals to the class. Class members may provide additional ideas for proposals.
8. Have students ask a school official (or custodian) if attempts were made to solve some of the school ground problems (or needs). If so, what were the results? The school official could be invited to visit the classroom to answer student questions.
9. Tell groups that they will be choosing one proposal and developing a step-by-step plan to implement this proposal. The plan could include: finances needed and how to get them, required tools, outside expertise, ways to change our own as well as other people's behavior, acquiring permission to do the project, etc.
10. Ask students to complete questions #7 and #8 and be prepared to share their proposal with the class.
11. As groups present their plans, other class members can suggest additional ideas.

12. After all groups have presented their proposals, ask students to vote on three proposals which they would like to help implement. Then ask students to indicate their first, second and third choices. Discuss with students what made them choose a certain project as first choice (e.g., Was it the most constructive? Most realistic? Apt to make a lasting contribution? Easiest to implement?). Discuss why some projects were not chosen.
13. Offer students an opportunity to make speeches to sway class opinion concerning the three preferred projects.
14. Discuss with administrator(s) the possibility of implementing one or two of these school improvement projects. A delegate or delegates could be chosen to speak to the principal, superintendent, and/or board of education.
15. Once approval has been granted, design a plan with your students to implement one of the projects, ensuring complete class participation. List all things which need to be done to ensure the project's success. Discuss who will do what in class and by what date. Make a time line. Assign additional research if necessary. Have students draw the proposed project and indicate where it will take place. The group members previously assigned to the problem can oversee the project.
16. If needed, invite professionals to talk to the class. For example, if a tree will be planted, a forester can discuss the proper procedure for planting a tree.
17. Implement the project. Invite the press. Take pictures.
18. After the project is completed, discuss the following with your students:
    - o How did you feel when you were working on the project?
    - o What are you most proud about?
    - o Did things work out as planned? Were there any unforeseen problems? If so, how were they or how could they be solved?
    - o What environmental projects could be implemented in the community?

EVALUATION ACTIVITIES:

Have students write a short essay on their feelings of and participation in the project.

KEY TERMS:

environment erosion

CAREER OPPORTUNITIES:

landscape architect

TECHNOLOGICAL APPLICATIONS:

1. We can use our technological knowledge to improve our environment.
2. Scientific inventions have improved schools in a variety of ways.

ETHICAL CONCERNS:

Individuals can make a difference by improving (or destroying) the environment.

INTEGRATION WITH OTHER CURRICULAR AREAS:

1. Writing an essay on their participation (language arts)
2. Working with others, discussing and expressing ideas (social science)
3. Estimating costs of project (mathematics)

HOME LEARNING SUGGESTIONS:

Have students do Homework Assignment, "Environmental Inspection."

EXTENSIONS:

1. Implement a community project (e.g., plant trees, clean up an area).
2. Participate in Arbor Day (March 7) and Wildlife Conservation Week (often the 3rd week in March).
3. Do Project Learning Tree's "Classroom Conservation," where students practice conservation of paper.
4. Do Project Wild's "Litter We Know," where students identify and evaluate ways litter pollution endangers wildlife.
5. Do Project Wild's "Keeping Score," where students recommend changes in their community which could benefit wildlife.

CURRICULUM REFERENCES:

Science Framework Addendum:

- Science and technology have been applied to solve human problems and enhance human creativity.

History-Social Science Framework:

- Acquiring information by listening, observing, reading, and using community resources.
- Analyzing cause and effect.
- Developing group interacting skills.
- Defining and clarifying problems.
- Reaching reasoned conclusions based on evidence.
- Discussing and debating.
- Organizing and expressing ideas in writing and speaking.
- Developing a keen sense of ethics and citizenship.

LESSON ADAPTED FROM:

- "Improve Your School Site," Project Learning Tree.
- "Can Do!" Project Wild.

SCHOOL GROUND ASSESSMENT

Names: ____________________

1. Environmental problem (or need) on the school grounds: ____________________

2. What clues did you find which indicated that the problem (or need) exists? ____________________

3. Describe the specific location of the problem (or need). ____________________

4. On the back of this worksheet, draw a map of your school and indicate where the problem (or need) exists.

5. Propose at least two ways to solve the problem, improve the situation or fulfill the need: ____________________

6. Ask school official(s) and/or custodian if what you have proposed has been done before. If so, what happened?

7. Select one of your proposals. Develop a step-by-step plan to solve the problem, improve the situation or fulfill the need (consider finances, tools, expertise, ways to change our own as well as other people's behavior, etc.). ____________________

8. How would you judge the success of your plan? ____________________

ENVIRONMENTAL INSPECTION

Name: ______________________________

1. List five environmental problems (and/or needs) in your yard or in your neighborhood.

   a. ______________________________

   b. ______________________________

   c. ______________________________

   d. ______________________________

   e. ______________________________

2. Choose one problem (or need) from question #1 and write down a step-by-step procedure on what you could do to solve the problem (or fulfill the need).

3. Write down how you think your family, friends and neighbors will react and what they might say if you completed the project you described in #2.

POST-OUTDOOR SCHOOL ACTIVITIES

Lesson 5

REWIND, PLAY, AND FAST FORWARD

LESSON SUMMARY: Students research their community's land use in the past and present and suggest ways they can influence future land-use.

GENERAL GOAL: To encourage students to determine the significance of the changes which took place in their community and predict future trends.

GRADE LEVEL: 5-7 **DURATION:** Three one-hour periods

LEARNING OBJECTIVES:

Upon completion of this lesson, students will be able to:

1. List those items in their community which are natural (nature-made) and those which were manufactured by people (human-made).
2. Identify nature-made items essential for human-made items.
3. Conduct an interview.
4. Describe present land uses as well as how the land looked and was used 20, 50, 100, and 200 years ago.
5. Predict how their community may look in the future.
6. Compare their community to the natural community found at the resident outdoor school.
7. Determine what they could do to ensure that the changes in their community are beneficial.

PROCESS SKILLS USED IN THIS LESSON:

1. Analyzing components in their community.
2. Categorizing nature-made and human-made components in their community.
3. Comparing present and past land uses.
4. Evaluating changes in their community.
5. Generalizing how individuals can affect future changes.

BACKGROUND FOR TEACHERS:

1. People are the only species which can consciously change its environment.
2. People build environments for their activities.
3. Some of the changes made in the environment by people have good effects and some have harmful effects.
4. Every city or community has a history of settlement or urbanization. The reasons for the settlement and/or expansion are often related to land use. For example, in the 1800's towns developed in areas which were favorable for farming, ranching, logging, or mining. Many communities also began in proximity to water such as rivers or the ocean because of access to transportation routes and availability of jobs such as fishing or trade businesses. Urbanization may occur near a job-generating site (e.g., factory).

5. Cities have developed as people have clustered together for purposes of meeting their needs for water, food, shelter, and a sense of community.
6. Most cities are not the result of careful planning, but have developed haphazardly.
7. Because of crowded conditions in cities and certain communities, various problems have arisen: crime, unemployment, poor housing, smog, contamination of water supplies by industrial and sewage waste disposal, energy consumption, transportation costs, and land use sprawl.
8. The livability of a city or community depends to a great extent upon the way its land area is utilized. Land can be used for many purposes: for individuals (parks, malls, housing developments, scenic easement); for institutions (schools, libraries, museums, prisons); for industry; and for transportation (parking lots, wider streets, freeways, airports).
9. Land use planning is important for community development, improvement, and maintenance.
10. Social, political, and economic factors influence planned changes in a community.

PREPARATION FOR LESSON:

Materials for Students:

Student Worksheet 1, "Today" (II Post 5, SW1)
Student Worksheet 2, "Yesterday's Gone" (II Post 5, SW2)
Homework Assignment, "The Interview" (II Post 5, HA)
Pencils

Materials for Teacher:

Chalkboard
Map of your community
If possible, illustrations and/or photographs of your community drawn or taken 50 or more years ago.

INSTRUCTIONAL STRATEGY:

1. Ask students to close their eyes and visualize the community in which they live. If they live in a city, or if there is a city nearby, they can visualize how the city looks.
2. Ask students to tell you what specific things they visualized as you write key words on the board. Examples: streets, sidewalks, trees, stores, houses, apartments, theater, restaurants, parks, etc.
3. Have students look at a map of their community and point out various areas: parks, roads, shopping mall, etc.
4. Distribute Student Worksheet #1. Ask students to write the items listed on the board into appropriate columns (nature-made or human-made) on their worksheets, and answer questions #2, #3, and #4. "Nature-made" refers to natural items such as trees, rocks, soil, wildlife, and water.

   Anything that was made or built by people (even if nature-oriented products were used) should be considered human-made. For example, a house contructed with wood is human-made, even though the wood is nature-made.

5. Review and discuss answers.
6. If possible, show illustrations and/or photographs of how this community looked 50 or more years ago. Lead students in a guided imagery. Ask students to close their eyes and imagine how their local area may have looked 100 years ago. Have them picture a place with no paved streets, no apartment buildings, etc. (Add things specific to your area.) Ask students, "Was there more vegetation and wildlife? What might the people living there be doing?"
7. Have students open their eyes and write a paragraph on what they imagined their area looked like 100 years ago.
8. Have students share what they imagined in small groups. Assign a recorder in each group to list key items which students shared.
9. Ask groups to report the key items to the class and list these on the board. Ask, "Were there more nature-made items than human-made items 100 years ago?"
10. Discuss how students can find out what their community looked like 20 years ago, 50 years ago, 100 years ago, and 200 years ago. The city or county's planning department could have some information, as well as the historical society in your area. The library may have old photos and/or newspaper articles. "Old timers" may have valuable information and could be interviewed. Have student volunteers explore various sources. Research what Native American tribes live and/or lived in the area.
11. Invite a city or county planner, a person from the historical society, or an "old timer" to your class. Have your class design a set of questions for the speaker. For example:
    - o How was this area different 20 and/or 50 years ago?
    - o What type of vegetation and animals were abundant?
    - o What made this community grow?
    - o Were the changes made beneficial to people? Why or why not?
    - o Was growth in this area planned carefully, or did it happen haphazardly?
    - o Were any changes considered good at the time they occurred and bad later on?
    - o What do you see in the future for this area?
12. Distribute the Homework Assignment, "The Interview." Students should interview one or two adults (including their parents, if appropriate) and record the answers.
13. Discuss the answers derived from the interviews.
14. After the speaker's presentation and information gathered by student volunteers, have students complete Student Worksheet #2, "Yesterday's Gone." Then discuss the following questions:
    - o Do you think that changes in the past 50 years have made your community a better or less pleasant place in which to live, or have they made no difference at all? Explain.
    - o What changes occurred in vegetation, wildlife, and human lifestyle in the past 50 years? In the past 100 years?
    - o Were any changes considered good at the time they occurred and bad later on?
    - o Who or what determines whether a change is good, bad, or in between?
    - o How can land-use planning (i.e., having a future plan) help a community?
15. Have students write a paragraph on their area 100 years ago based on research and/or the speaker(s) and compare it to the paragraph they wrote at the beginning of the lesson.

16. Ask students to close their eyes and imagine the changes which might occur in the area in the future. What could this area look like in 50 to 100 years? Who might decide how the land will be used? Ask students to draw and/or write a description of the changes they imagine. Have students share their drawings and/or descriptions.

DISCUSS QUESTIONS:

1. What do you think will happen to the population of your community in the next 50 years?
2. What could you do to ensure that the changes in your community are beneficial to people and the environment?
3. Why is land use planning important?
4. Do you think you might live here when you grow up? Why or why not?

EVALUATION ACTIVITIES:

1. Review Student Worksheets, Homework Assignment and written paragraphs on the community's past and future.
2. Have students write on this topic: I wish I lived in this area in the year ____ because ...

KEY TERMS:

Land use planning

CAREER OPPORTUNITIES:

Land use Planner

TECHNOLOGICAL APPLICATIONS:

People can use technology to make communities better places to live for everyone and still provide areas for wildlife. How?

ETHICAL CONCERNS:

Ethical questions arise as people make decisions about where and how they will live. Any development of an area has an impact on the plants and animals who do and can live there, as well as any people who might live there.

INTEGRATION WITH OTHER CURRICULAR AREAS:

1. Writing (language arts)
2. Drawing (art)
3. Working with others, discussing and expressing ideas (social science)

HOME LEARNING SUGGESTIONS:

1. Have students write an essay comparing their community to the natural community found around the resident outdoor school.
2. Ask students to look in local newspapers to discover what environmental problems are being faced today in their community.

EXTENSIONS:

1. Have students draw a graph representing the population growth of their community in the past 100 to 200 years.
2. Do Project Wild's "Planning for People and Wildlife," where students develop a community in which people live and work with the least negative impact on the existing vegetation, air quality, water, soil, and wildlife.
3. Do Project Wild's "To Zone or Not to Zone," where students identify social and ecological considerations of land use and the importance of land-use planning.
4. Do Project Learning Tree's "Changing Land Values," where students describe some of the changes in land use in their community from standpoints of various community members.
5. Do Project Learning Tree's "Did You Notice," where students describe changes in their community that they observed through a field trip and researched in the library.

CURRICULUM REFERENCES:

Science Framework Addendum:

- The nature of our society is strongly influenced by science and technology.
- Application of science and technology to solve human problems can create other problems. Examples are over-population, depletion or pollution of soil, and traffic hazards.
- Land use, pollution, energy use, and application of technology all involve ethical considerations for individuals and society.

History-Social Science Framework:

- Acquire information by listening, observing, reading, and using community resources.
- Developing group interacting skills.
- Locating, selecting, and organizing information from written sources.
- Organizing and expressing ideas clearly in writing and speaking.
- Reaching reasoned conclusions based on evidence.
- Analyzing cause and effect.
- Identifying consequences, intentional or unintentional, of human decisions affecting the environment in the process of land transformation.
- Understanding reasons for continuity and change.
- Understanding human and environmental interactions and how humans modify the landscape.
- Developing place awareness (where human events have taken place).
- Understanding vital connections among the past, present, and future.

ADAPTED FROM:

- All Around You, An Environmental Study Guide.
- "Community Land Use," Project Learning Tree. (Grades 7 through 12).

II Post 5, SW1

TODAY

Name: ______________________

Write down items listed on the board in appropriate columns.

1.

Nature-Made (natural) Items	Human-Made Items
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________

2. Are there more nature-made or human-made items in your community?

____

3. Has this always been true? Why or why not? ______________________

____

4. Even though we usually have more human-made items in our community today, we still depend on nature-made items to build our environment. Choose three human-made items from your list in #1 and write down what natural products may have been used to make them.

Human-Made Item	Nature-Made Product Used in the Item
1) ______________________	1) ______________________
______________________	______________________
2) ______________________	2) ______________________
______________________	______________________
3) ______________________	3) ______________________

THE INTERVIEW

Name: ____________________

1. Ask an adult who has lived in the community for many years the following questions and record the answers.

   a. How long ago did you move here? ____________________

   ____

   b. Why did you move into this community?

   ____

   ____

   ____

   ____

   c. What three things have changed in this community since you moved here? Were you happy with these changes?

	Things That Have Changed	Happy/Unhappy
1)	____________________	__________
2)	____________________	__________
3)	____________________	__________

   d. Do you think this community needs (circle and list all that apply):

   more parks, open space, trees, or ____________________

2. Write down one more question you want to ask and the answer you were given.

   Question: ____________________

   ____

   Answer: ____________________

   ____

   ____

YESTERDAY'S GONE

	Use of Land	Negative Effect on the Environment	Major Industry, Business or Occupations	What Residents Value or Valued in this Area	Number of People Living in the Community
Example:	**housing, roads, businesses**	**air pollution**	**small and large businesses**	**park, roads, convenient shopping**	**100,000**
Present					
20 years ago					
50 years ago					
100 years ago					
200 years ago					

CHAPTER 4

LINKING TECHNOLOGY TO THE RESIDENT OUTDOOR SCHOOL EXPERIENCE

INTRODUCTION

This chapter is aimed at helping educators become more discriminating in the selection and use of appropriate technology related to preparing for and increasing the meaning of the outdoor school. Instruments of technology extend the senses and facilitate learning. Although the microscope and telescope are instruments of technology, considered here are the newest arrivals on the technological scene: instructional television programs (ITV), interactive videos, laser discs, and computer software.

The use of technology cannot and must not replace valuable participatory outdoor experiences. Offered here are suggestions for integrating "high tech" with the "high touch" world of the resident outdoor school. Some instructional objectives for the utilization of technology before, during, and after outdoor school, with descriptions for possible avenues to achieve these, are given.

BEFORE OUTDOOR SCHOOL

Technology provides motivating, effective, and interesting ways to involve students in acquiring skills and science concepts. The following objectives frame possible "high tech" activities in which students can participate before outdoor school.

1. To facilitate the acquisition of basic vocabulary and concepts applicable to the outdoor school.

   - Utilizing software addressing environmental science concepts and vocabulary, students can build food webs and see a visual display of population changes. Simulations such as these can help students visualize and interact with models of reality that cannot be fully experienced at the outdoor school setting.

   - A comprehensive curriculum program with hands-on activities, books, instructional television (ITV), and computer software can provide extensive information on a particular environment. Students can interpret and analyze data while having opportunities to synthesize, question, and apply information.

2. To develop skills that students can apply during and after the outdoor school experience.

   - Orienteering software develops an understanding of this outdoor skill while also applying critical thinking and problem-solving skills.

   - Software related to understanding photography is meaningful to students who have varying levels of photographic skills and knowledge.

   - Using interfacing probeware, students can measure, record, and graph temperature, light, speed, and response time.

- Students can become familiar with data base programs to record, sort, and analyze data. Students can collect data during outdoor school following a prepared format and enter the information into a data base upon returning to the home school. Sample data bases could consist of types of trees in various environments, bird sightings with a frequency count of species, and weather observations.

- Word processing software can be used by students to facilitate story and report writing about outdoor school experiences.

3. To increase familiarity with outdoor school site.

   - Viewing a video on the the outdoor school could be an advance organizer to help orient and motivate students. When shown to parents to illustrate the unique educational experiences available to students, the value of this video can be increased.

DURING OUTDOOR SCHOOL

Incorporating technology into outdoor school to expand students' perceptions of the natural world offers distinct possibilities for effective lesson designs. The emphasis on the use of the out-of-doors must not change. For example, the microscope is a common instrument at outdoor school; but when combined with a videocamera and large television monitor, it allows for group observation and discussion. In the future, the newest technological arrivals on the educational scene will be just regular items on the checklist of equipment, as is the microscope now. Consider these potential applications.

1. To illustrate environmental situations that students might not be able to otherwise experience.

   - Video and laser disc programs could show plants and animals found at the outdoor school site during different seasons.

   - Computer simulations could be used to demonstrate the effects of pollution on the environment, predator-prey relationships, and population studies.

2. To provide brief tutorials.

   - An astronomy video or computer simulations could prepare students for a night hike and stargazing. Instruction about constellations, rotation of stars, and telling time by the stars can be provided using computer software and videos.

   - A software tutorial on local trees could be shown on a large screen monitor and then correlated with training in the use of a dichotomous key.

3. To record experiences.

   - Requiring considerable teacher input and direction would be the development of a videotape at the outdoor school. The tape could be used as a motivator for next year's class. Copies of it could be sold as a fund raiser to support the outdoor experience; parents and students alike would cherish such a record of the outdoor experience.

AFTER OUTDOOR SCHOOL

The students' participation in the outdoor school provides an experiential basis and support for the following applications of technology.

1. To reinforce and extend conceptual learnings.

   - Using concepts and vocabulary, students can create crossword puzzles and word searches with a variety of software programs.

   - Using software with a game format for a dichotomous key, students can develop a file of characteristics for plants and animals and then use the file to identify the organism.

   - Students can use data bases to enter and sort data gathered on plants and animals found at outdoor school and their home school. Using higher level thinking skills, they can analyze data and determine similarities and differences. The information gathered could be used in classification activities.

2. To apply science concepts and outdoor school experiences to other areas of the curriculum.

   - Using word processing programs, students can write reports and nature stories. Also, they can write letters to outdoor school staff and to other students who participated in the outdoor school experience.

   - They can use telecommunications to share experiences and information with other schools and agencies within this and other states.

   - Low and high resolution graphics programs can be authored and generated by students to produce drawings which can accompany reports. Drawings might include leaves, birds, and trail maps indicating where plants and animals were found.

   - Students could produce an environmental newspaper.

   - A graphing program can be used to display data collected at the outdoor school.

3. To reinforce ethical considerations.

   - Software simulations on endangered animals can allow students the opportunity to apply an understanding of the basic needs of animals to loss of habitat and other factors in a problem-solving format.

   - Banners with environmental statements can be designed, printed, and displayed around school.

CONCLUSION

All educational settings, including the outdoor school, should take advantage of new technology becoming available. Technology has the potential to positively affect student outcomes from the outdoor school. Its incorporation would be most effective if applied as part of an articulated technology program at all grade levels.

The objectives and applications provided in this guide are meant to be examples only. Careful selection of appropriate technological materials should be based on consideration of: (1) specific objectives of the outdoor school program; (2) expert reviews of available materials; and (3) personal previews.

The potential use of technology is expanding daily because of new developments in the field. With training and experience, teachers and students are utilizing it in increasingly sophisticated applications. The teaching strategies and techniques used by teachers, along with resultant skills acquired by students, justify the inclusion of the rich new resource, technology, in the outdoor education program.

CHAPTER 5

PHOTOGRAPHY AT THE RESIDENTIAL OUTDOOR SCHOOL

FOR THE TEACHER

The objective in using photography is to help students acquire an awareness of the natural environment and appreciate the value of visual communication. By helping students with a few simple photographic concepts, teachers can enhance the students' memories of their outdoor school experience and help them to share the experience with family and friends.

In every group of students going to the outdoor school there will be several who take cameras. Rather than letting them produce poor quality pictures without guidance, the teacher can seize the opportunity to give instruction of lifelong value and at the same time achieve a class goal. Before the students go to the outdoor school, their teacher can provide basic instruction in a few principles of photojournalism, camera operation, composition, and visualization.

SLIDE SHOW VS. SCRAPBOOK

Decide for yourself whether your objectives for the class are best served by a photo scrapbook or a slide show. The latter can be very useful in building student pride and satisfaction, providing a show for parents' night, and rationalizing the outdoor school program to school boards, community organizations providing funding, etc. Scrapbooks of color prints may be easy to assemble because negative films used for prints are easy to use and do not require sophisticated equipment. Scrapbooks are larger and less expensive than slides; "magnetic" photo albums are easy to use and often may be reused. Thirty-five millimeter cameras can use either slide or print film; disk or 110 cameras are best suited for prints. You may find it easy to decide if you discover the cameras available to your students.

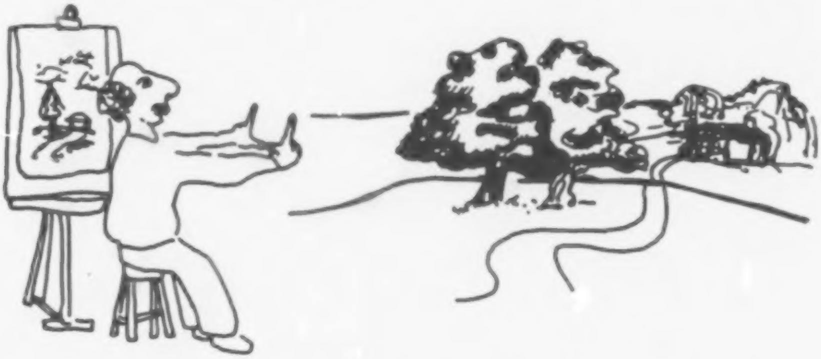
ABOUT CAMERAS, FILM, ETC.

Most students use an automatic or instamatic pocket camera requiring only the "aim and shoot" approach to photography. Be sure students know how to load, advance, rewind, and unload film. Film choice is made to get prints or slides. If you want prints, select "negative" film, which frequently has "...color" as part of the name. Kodacolor, made by Eastman Kodak, is an example. Film intended primarily for slides will be identified as slide film on the box and "...chrome" in the name. Fugichrome, Agfachrome, and Ektachrome are examples.

ESTABLISHING A PHOTOGRAPHIC PROJECT

After you have established whether your project is a slide program or a scrapbook, teach the students how they can collectively tell a story with their cameras. Photo stories were the strengths of many older magazines -- Time, Life, Look, etc. This style is still used in covering some subjects appearing in Ranger Rick, Geo World, National Geographic Magazine, etc. It may be helpful to have students bring in magazine stories with pictures. Clip the photos out and tape them to the chalkboard in the order of their use in telling a story.

Composition. Many artists learn composition by observing how other photographers "do it." Have students extend the thumb and index finger of each hand to form an "L." Now touch the index finger of one hand to the thumb of the other, thus joining the "L's" to form a rectangle that simulates a viewfinder. Direct them to use this viewfinder to "take photographs" in the classroom and on the playground.



Usually the students' greatest weakness is not approaching close enough to the subject to give adequate visual importance to that subject. Desirable detail is lost when the subject is too small in the picture. This may be caused by a viewfinder which gives a deceptive view, a camera which will not focus close--but most likely from the photographer's unwillingness to overcome shyness and to approach the subject.

A simple picture is usually more successful than a complicated picture. Help the students to look at pictures with the intention of seeing what parts might be removed to make them simpler and stronger. Demonstrate the greater ease of "reading" a photograph with a simple, smooth-toned background as compared with one with a complicated, spottily toned or brightly colored background.

Story-Telling Techniques. Motion picture and television stories, particularly the soaps, the sitcoms, and many programs just after commercial breaks use photo journalism techniques. As you start to analyze the techniques used, you'll recognize a familiar pattern:

- The first picture, termed a Long Shot (or Establishing Shot), shows the overall area or view of the story or scene of the story.
- The second picture, a Medium Shot, shows the interaction or relationship among the members of a small group, perhaps two or three people.
- The third picture in the sequence is the Close-Up. A successful Close-Up shows something about the feelings of that person, a reaction, or some relationship with the environment. An extreme Close-Up shows some detail not normally observed, such as the petals of a small flower.

This sequence can be shown to the students and be part of their assignment for taking pictures during the outdoor school program.

Choosing a Title. Complete the introduction to the photography project by giving a title to the photo assignment. State the title in their terms but express the project goal. Titles should be catchy, but should express an appreciation of the content of the slide program or album. "Science--and Other Stuff-- Learned at Outdoor School" might be an appropriate theme for a photo project.

Give Photo Assignments. In terms of dividing the work of the project into manageable units, give each student one or more 3 x 5 cards with an assignment. See that each activity at the outdoor school is photographed. Specify Long Shots, Medium Shots, and Close-Ups. Plan to have an adult with photographic experience take flash pictures of the evening activities.

Be sure that several group photos are taken so that every child appears several times in the slide show or photo album.

PLAY "I AM A CAMERA"

Students assemble a "mental" picture album while playing this game. Blindfolded students, playing the role of view cameras, are led from place to place by their student partners, the "photographers."

The partner bends and positions the blindfolded students, much as a photographer positions a view camera. The "photographer" moves the "camera" into position to gain a view of the chosen subject in a Close-Up, a Long Shot, and unusual angle, etc. The "photographer" then removes the "lens cap" (the blindfold) and the student who plays the camera looks at the scene, without moving eyes or head, for three or four seconds.

An "album" of perhaps six images is assembled this way. Then the blindfold is put on the other student, and the "camera" becomes the "photographer."

Students who play "I Am A Camera" become more aware about photography and creativity is frequently enhanced.

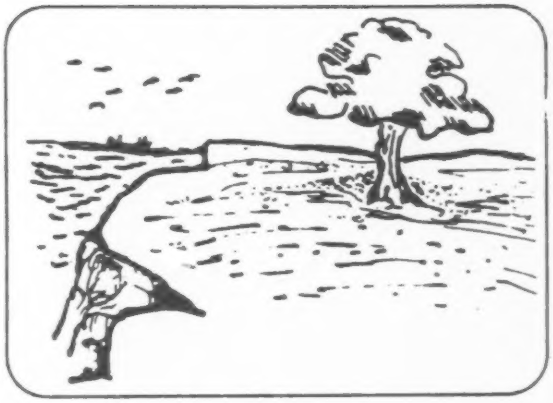
STUDENT JOURNAL PAGES

It is usually helpful to use a journal to provide continuity to instructional programs which have activities at the outdoor school. The following Student Journal Pages may be used as assignment sheets or merely as reminders of classroom instruction.

The Final Questions. Finally, review your program by asking yourself, "Does the program show the who, what, where, when, why, and how of the event?"

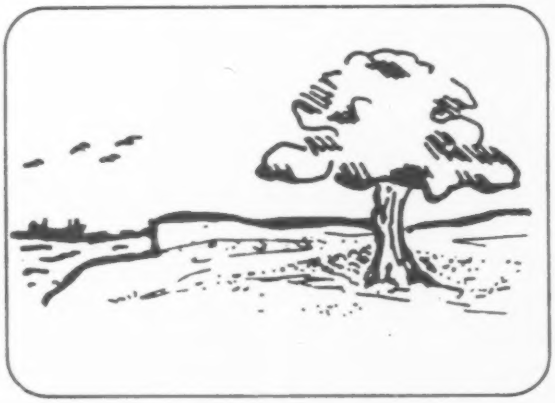
LONG SHOT

A picture story starts with an overall view–a bird's eye view–called a Long Shot (LS) or Establishing Shot. You see the subject in its surroundings.



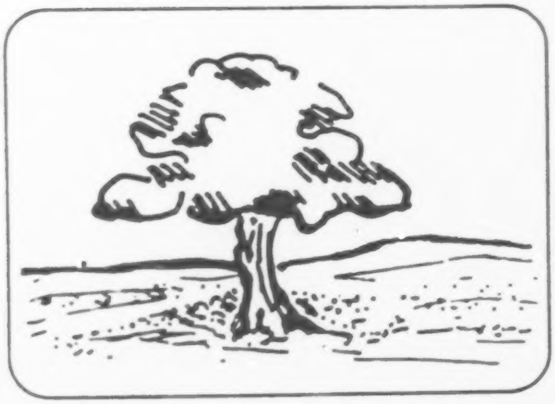
MEDIUM SHOT

A Medium Shot (MS) shows the subject as the center of interest or the focal point. It can show action between two or three people.



CLOSE UP

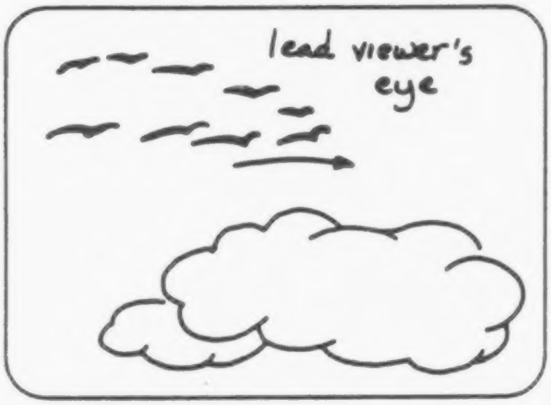
A Close-up (CU) shows the subject , usually alone. It can show a person's face and how that person feels about what is happening. An Extreme Close-up (ECU) shows details that are not normally seen, like the petals of a tiny flower or the eye of an insect.



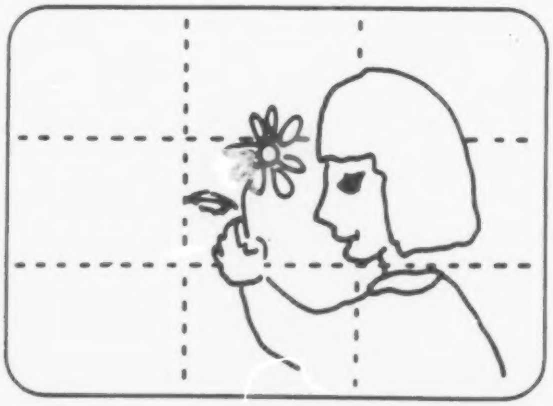
COMPOSITION

Although not always necessary, it is helpful when composing a picture to:

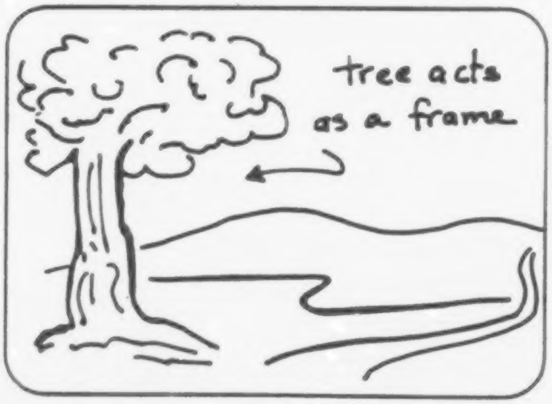
1. Be aware of the background.
2. Be aware of the total picture, from edge to edge.
3. Be aware of the viewer's eye movement. Compose the picture to lead the viewer's eye where you want it to go.



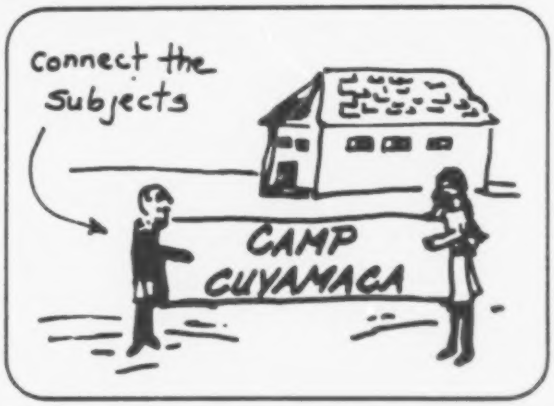
4. Good subject placement in a picture is off center. Imaginary dividing lines will help you place the subject at one of the "X" positions.



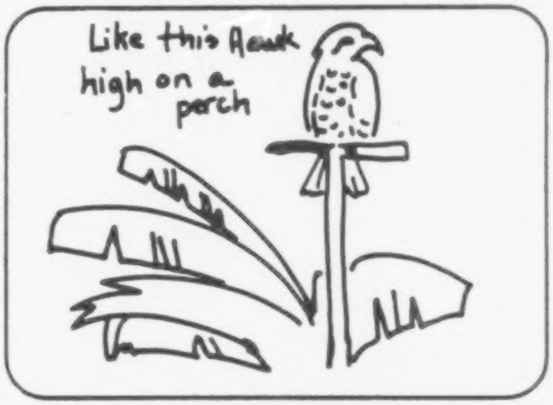
5. Use natural framing for simple composition.


tree acts as a frame

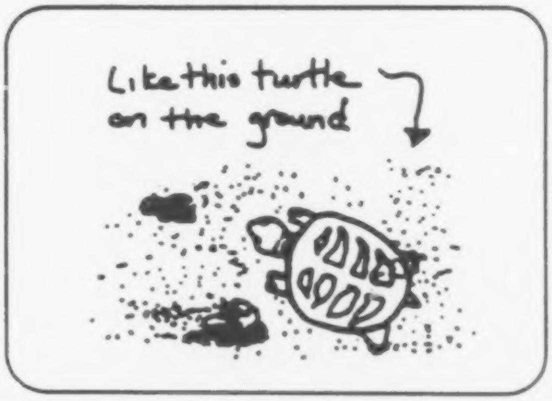
6. Connect subjects to let the eye go easily from one to the other.


Connect the subjects
CAMP CUYAMACA

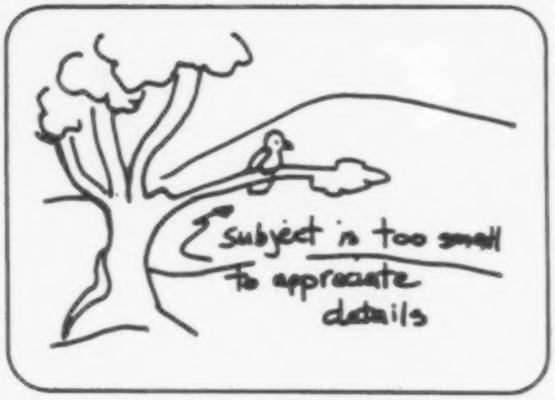
7. a. When shooting up, put the subject near the top of the frame--like this hawk on a high perch.

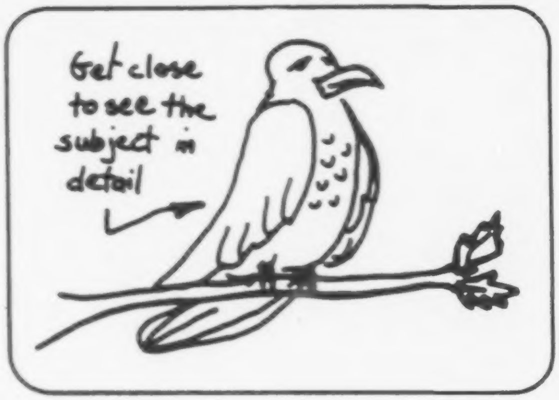

Like this Hawk high on a perch

b. When shooting down, put the subject near the bottom of the frame--like this turtle on the ground.

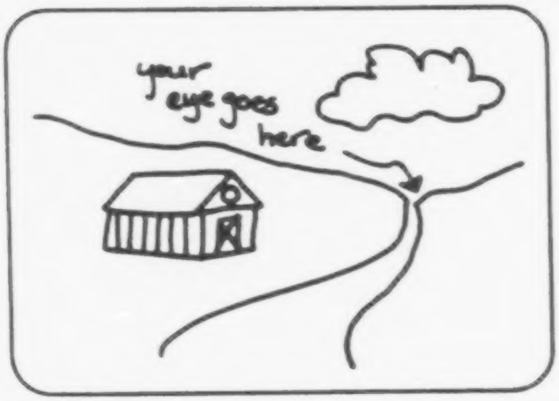

Like this turtle on the ground

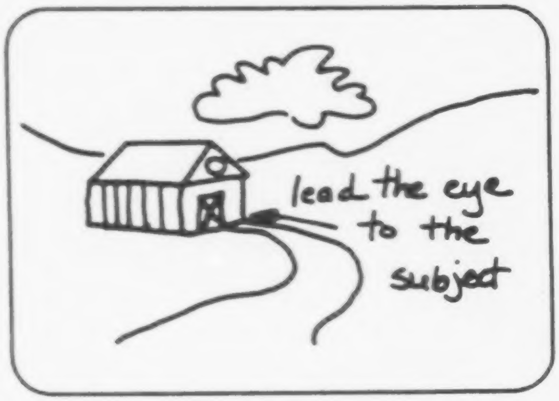
8. Fill the frame. Use the total photograph.


subject is too small to appreciate details

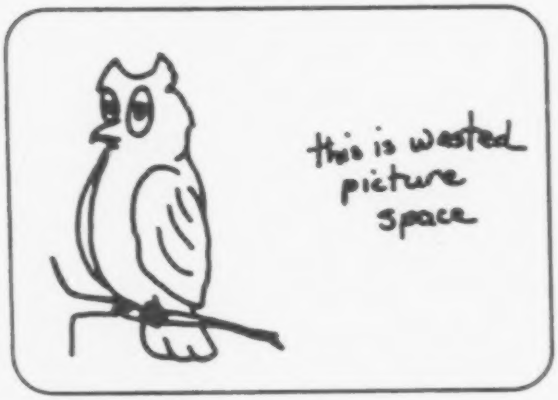

Get close to see the subject in detail

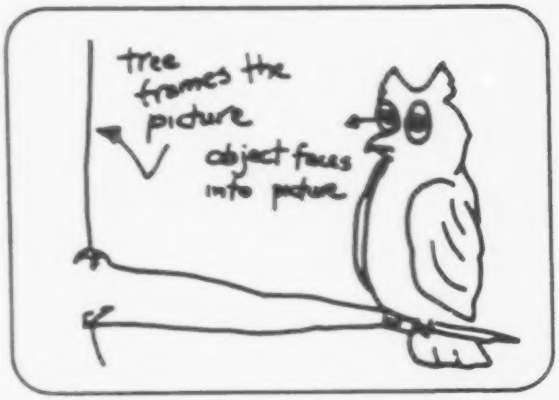
9. Try to have strong lines leading toward the center of interest.


your eye goes here

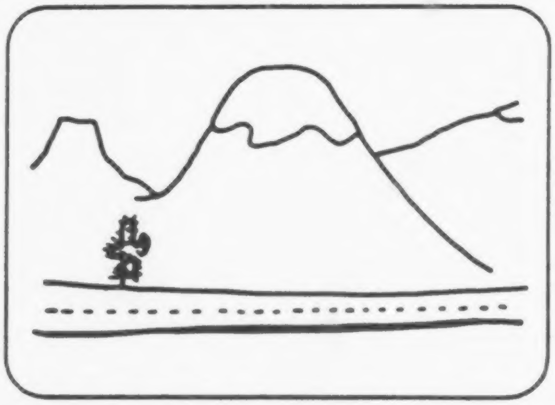

lead the eye to the subject

10. Have subject face into the picture.

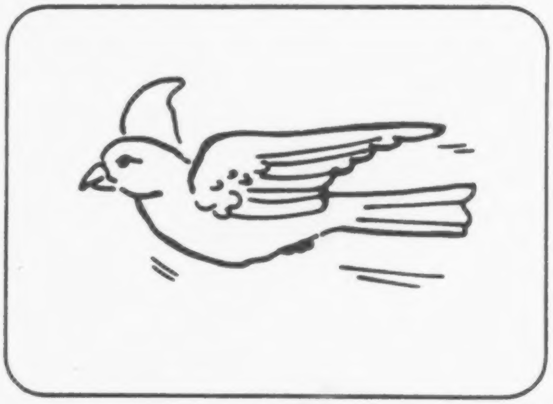

this is wasted picture space


tree frames the picture
object faces into picture

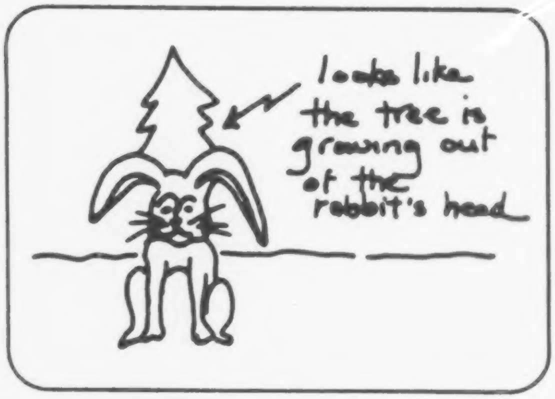
11. Avoid strong horizontal lines that seem to cut off the picture.



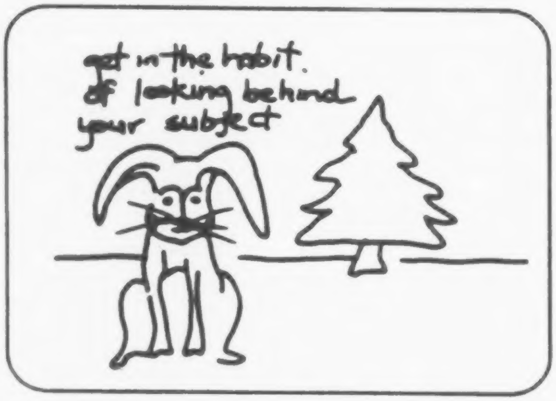
12. If possible, have your subject doing something. Action is exciting. Move your camera with the subject or the image will be blurred when you snap the picture.



13. Avoid placing your subject in front of objects so that images merge to produce strange pictures. However, you may want to produce funny effects by creating mergers.



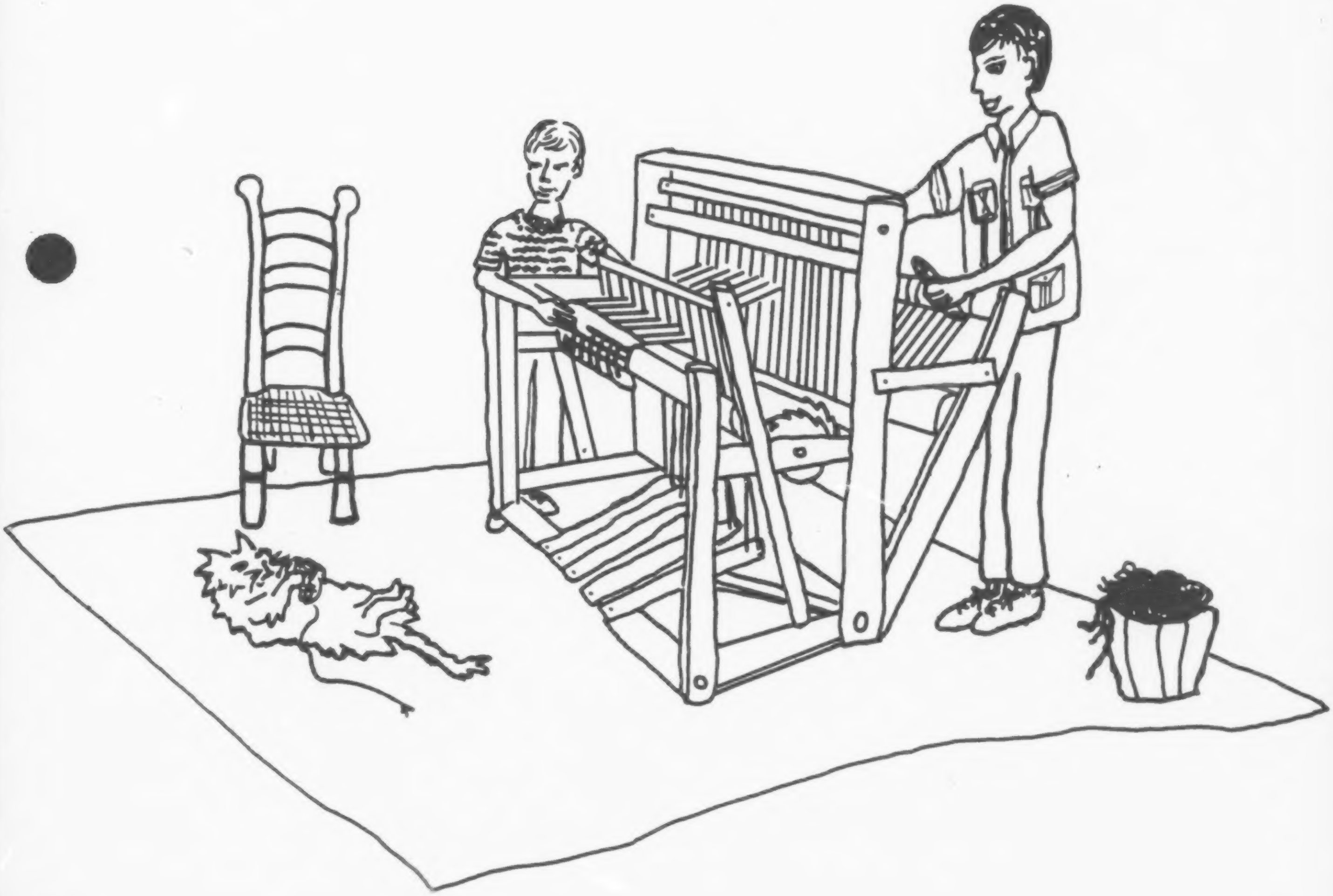
looks like the tree is growing out of the rabbit's head



get in the habit of looking behind your subject

SECTION III

PARENTAL INVOLVEMENT WITH OUTDOOR EDUCATION



PARENTAL INVOLVEMENT WITH OUTDOOR EDUCATION

Parental involvement is needed at many levels for the outdoor education program to be fully and successfully implemented. This includes the students' parents recognizing the value of the program and being active participants in several ways. The parents' involvement makes a difference in the successful implementation of the outdoor education program, not just for their own child, but for all the students.

Parental involvement is best understood when focused on the roles as learner, supporter, and teacher.

1. Parents are learners as they increase their understanding of the educational objectives and benefits of outdoor education for their child.

2. Parents are supporters as they facilitate the attendance of their child at resident outdoor school.

3. Parents are teachers as they assist their child in related learning activities at home before and after resident outdoor school.

These three roles of participation are not independent, but are linked together. They are most easily facilitated when parental involvement is part of a schoolwide plan at all grade levels. Also, the value of outdoor education is best understood by parents when it is part of a sequential program in environmental education, not just an isolated experience. Having a sequential program should be a desired goal.

PARENTS ARE LEARNERS

Parental learning ranges from achieving an understanding of the merits of the outdoor education program to specific components of the resident outdoor school site. Having informed parents is critical for reaching the maximum learning possible through outdoor education. "Back-to-School Night" in the fall would be an ideal time to present such an overview. A presentation should include:

1. Definition of outdoor education.

2. Samples of pre-, during, and post-activities.

3. Relationship of educational process and outcomes to objectives for specific grades levels.

4. Emphasis on the uniqueness of the learning environment provided by the resident outdoor school.

Details about the resident outdoor school could be presented at the same time or at a later date. An orientation letter is necessary; an audiovisual presentation is highly recommended.

Orientation to the outdoor school should be concerned with five overlapping categories: program, site, personnel, student problems, and costs.

1. Program: value of the education program; types of unique activities.
2. Site: location of facilities, sleeping and supervision arrangements, food quality and variety.
3. Personnel: expertise and qualifications of resident outdoor school staff.
4. Student: personal concern for health and safety needs, social interaction problems, etc.
5. Costs: financing alternatives, fund-raising.

Consideration of multicultural aspects is necessary. These cultural aspects can include home language and specific areas of parental concern.

The following may be helpful:

Potential Concerns	Possible Solutions
Resistance to starting an outdoor education program at school	Interested group of parents visit the outdoor school site and share observations with other parents. Selected groups of students attend outdoor school and share success stories
English is not the home language	Give audiovisual program and provide informational flyer in home language
Concern about supervision, facilities, safety, personnel, and activities, especially for girls	Program for parents should address specific concerns: -- Separation of facilities, including housing, restroom, and showering areas. -- Safety precautions. -- Number and qualifications of responsible personnel. -- Examples of the educational value of activities. -- Examples of caring supervision.
Nonresponse to letter and/or nonattendance at informational program	Telephone call or home visit to discuss program and concerns of parents

Learning by parents also entails having them recognize the value of their involvement in home activities that occur before and after resident outdoor school. The pre-activities orient the child toward the outdoor school experience. Follow-up activities extend and reinforce learnings. Examples of these activities are described later under "Parents are Teachers." When the teacher requests that parents become involved in their child's learning at home, parents tend to:

-- recognize the educational effort of the teacher

-- feel that they should help their children at home

-- understand more about the instructional program

Another way for parents to achieve a greater understanding about the value of outdoor education is to view follow-up activities done at school. Two examples are:

-- Parents visit the school when students show the results of activities done at outdoor school.

-- Students prepare a newsletter describing activities at the outdoor school and take the newsletter home to parents.

PARENTS ARE SUPPORTERS

Support for outdoor education is gained from parents who are knowledgeable about the program. Support means saying "yes" to their child attending resident outdoor school, participating in certain pre- and post-activities, and, more than likely, committing financially as well. Support is best gained through the planning and implementation of a comprehensive orientation program.

Parental financial contribution ranges from 0 to 100% of the outdoor program's cost, which in 1986 was approximately $100 for a 5-day and 4-night program. In the state of California, parents typically contribute 61.5% of the cost (Orange County Department of Education, 1986), either directly or indirectly through fund-raising.

Financial hardship must not be a reason for lack of program support by parents. Every effort should be made to provide scholarships to all those who need them. Fund-raising activities should actively be done to reduce the overall program cost and/or to provide scholarships.

PARENTS ARE TEACHERS

Parental involvement with children in home learning activities provides an additional avenue to increase the impact of the outdoor education experience. Parents need to be told that their involvement as teachers makes a difference in the maximum benefits of the program. As parents are given specific tasks to do, they are provided the opportunity to enhance their skills in interacting with their own child. If the home language is not English, the parents need to understand that their interaction with their child is more important to their child's educational success than the particular language used.

Research has shown that science has meaning for children in the context of personal living with their parents (Voelker & Horvat, 1976). Thus, activities which promote interaction between children and parents may help the students become more interested in science. The best activities may be those that children do with parents.

Activities done before outdoor school emphasize preparation. Suggestions for these, which parents could facilitate, include:

1. Parent and child discuss behavioral standards and sign contract (sample included).
2. Child marks personal items to be taken to outdoor school (sample included).
3. Parent and child discuss expectations and goals for outdoor school (sample included).
4. Parent and child complete a science investigation together (sample included).
5. Child practices taking 3 minute or shorter showers at home.
6. Child practices setting table.
7. Parent assists child in mastering operation of a camera which could be taken to outdoor school.

Samples of appropriate parent-child activities, ready to be sent home, are provided in this section. The home learning suggestions in the lesson plans in Section II provide additional ideas for activities.

Post-activities focus on the child is sharing and expanding on experiences from outdoor school. The parent-child evaluation form, sent home a week after outdoor school, provides a format for parents to discuss and learn about the program with their child. A sample evaluation form has been provided.

Another post-activity provided in this guide is a list of suggestions for educational activities that will extend the benefits of outdoor school and also tie in with the parents' busy schedules. Such a list of activities is certainly in congruence with the notion that education is a life-long learning process.

As parents expand their vision of the range of satisfying interactions with their child, they will be assisting their child in acquiring knowledge and skills for effective citizenship. Also, they may become learners as well, not just about the environment, but about their own children and the strategies of education.

Home Activity
Pre-Outdoor School

Modify as necessary

NOTE: Add to this your schedule of activities at resident outdoor school. This will facilitate the parent-child discussion on Day 3.

Child Weaving

PREPARING FOR RESIDENT OUTDOOR SCHOOL
A THREE-DAY ASSIGNMENT

Note to Parents:

Your child's upcoming experiences at the outdoor school will make a very important contribution to his/her education. Attached are three brief preparation assignments. Please complete them in order. As you and your child complete these assignments over the next three days, you will be helping him/her to be well-prepared for this enjoyable, educational experience.

Be sure to read the background information and directions before assisting your child in completing the three assignments.

BACKGROUND INFORMATION AND DIRECTIONS

DAY 1
RULES AND REGULATIONS

The outdoor school is an outstanding opportunity for students to increase their sense of self-worth and to learn responsibility and cooperation through group living, as well as to study science. Students who come with a positive attitude and are ready to share, cooperate, and work in a group will have a successful week. It is necessary for each student to be aware of the rules and follow them for a safe, enjoyable week.

Read and discuss together the behavioral standards for resident outdoor school. Both of you need to sign the form. Your child must return the bottom portion to his/her teacher.

DAY 2
CLOTHING AND EQUIPMENT FOR OUTDOOR SCHOOL

Review together the list of items to bring to the outdoor school. Select clothing and other appropriate items. Old clothing is fine. Sheets and blankets will serve the same purpose as a sleeping bag. Your child needs to:

- Label each item of clothing and equipment with his/her name if possible. Use an indelible pen.

- Write out a list of clothing and equipment. Attach this list to the inside of luggage to be used as a checklist when packing for outdoor school and repacking at the end of outdoor school.

DAY 3
EXPECTATIONS AND GOALS

Outdoor school is academically oriented and designed to enrich and reinforce the learning that takes place in the classroom. The outdoor setting provides for learning through direct observation and experiences. Students develop greater awareness of and appreciation for the environment. With this awareness, the need for realistic and responsible conservation practices becomes apparent. Discuss with your child the types of activities and learning that might occur at outdoor school. Complete statements 1 and 2 on the Expectations and Goals page.

Responsibility, respect, and reliability are stressed at the outdoor school. The group living encourages and reinforces the development of these traits. Each student will assume responsibility for cabin neatness, caring for personal belongings, personal cleanliness, setting tables, and other requirements of living. Students will come to know and understand their classmates, teachers, and maybe even themselves better. Discuss with your child: In what ways will living with a group of other students be different than living at home? What can be done by him/her to contribute to a good experience? Have your child complete statements 3 and 4 on Expectations and Goals. This assignment should be returned to your child's teacher.

DAY 1
RESIDENT OUTDOOR SCHOOL BEHAVIOR CONTRACT

BEHAVIOR STANDARDS = Respect, Responsibility, Reliability

1. Be Courteous And Polite
   a. Be a good team member; share and take turns
   b. Be a good listener; follow directions
   c. Share in the work; show sportsmanship
   d. Be considerate of others' belongings
   e. Do not pick plants or do any other activity that damages the environment
   f. No fighting or bad language

2. Be Committed
   a. Plan to stay on-site the entire time
   b. Do not make commitments to attend team sports, music lessons, etc. at home during the week of the outdoor school program

3. Follow The Outdoor School Safety Rules
   a. Walk; do not run (to prevent injuries from tripping on loose rocks)
   b. Stay with your supervising adult and group
   c. Do not throw objects (rocks, snow, sticks, etc.)
   d. Do not carry walking sticks on trails

4. Leave These Items At Home
   a. Food, gum, candy (these attract insects)
   b. Money (no place for spending)
   c. Radios, electronic games
   d. Curling irons
   e. Knives, sharp tools
   f. Valuables

FAILURE TO FOLLOW STANDARDS SET AT OUTDOOR SCHOOL WILL RESULT IN THE FOLLOWING PROCEDURES:

- A conference with student and outdoor school staff.
- If the problem is not resolved, a phone conference with school principal and parent or guardian.
- If the problem is still not resolved, the parent will be requested to take the student home.

- -

CUT ALONG DOTTED LINE, AND RETURN BOTTOM PORTION TO CHILD'S TEACHER

PARENT AGREEMENT — I have reviewed the Outdoor School Behavior Standards with my child. Should there be any serious difficulty with following the expectations, I support the implementation process (above) and, if necessary, will bring my child back home.

PARENT OR
GUARDIAN SIGNATURE ______________________________

STUDENT AGREEMENT — I have reviewed the Outdoor School Behavior Standards and will follow the standards outlined. I understand that I may lose my privilege to attend outdoor school if I fail to follow them.

STUDENT SIGNATURE ______________________________

DAY 2

SUGGESTED ITEMS FOR THE OUTDOOR SCHOOL

THESE ITEMS ARE ESSENTIAL

BEDDING

_____Sleeping Bag OR Sheets and 3 Warm Blankets

_____2 Bath Towels and a Wash Cloth

TOILET ARTICLES

_____Toothbrush and Toothpaste
_____Comb and/or Brush
_____Soap

CLOTHING

_____Underwear - 4 Changes
_____Socks - 6 Pairs
_____Pajamas
_____Jeans or Durable Long Pants 2-4 Pairs
_____Shirts - Long & Short Sleeves 4 Total
_____Heavy Sweater or Sweatshirt
_____Warm Jacket & Hat
_____Swim Suit (April - October)
_____Shoes - 2 Pairs Closed Shoes Suitable for walking (Tennis Shoes are fine)

RAIN GEAR (Where applicable)

_____Raincoat or Poncho
_____Rain Hat
_____Rain Boots

THESE ITEMS ARE CONVENIENT, BUT ONLY IF AVAILABLE

BEDDING AND TOILET ARTICLES

_____Pillow
_____Chapstick
_____Shower Thongs
_____Hand Lotion
_____Soap Box
_____Kleenex

EQUIPMENT

_____Laundry Bag
_____Camera, Film, Flashcubes
_____Day Pack
_____Canteen
_____Gloves
_____Stationery
_____Stamps
_____Pencil/Pen
_____Small Notebook - For Note Taking

THE FOLLOWING ITEMS ARE NOT TO BE TAKEN TO THE OUTDOOR SCHOOL

Jackknives
Money
Radio
Jewelry (may get lost)
Food - Gum, Candy, Cookies, Cake, etc.
High Heel Shoes
Hair Dryer, Electric Curlers, Curling Irons
Comic Books
Fishing Gear
Electronic Games

* *

TO AVOID LOSS OF CLOTHING OR EQUIPMENT PLEASE LABEL ITEMS AND ATTACH THIS FORM TO INSIDE OF LUGGAGE TO BE USED AS A CHECKLIST WHEN RE-PACKING.

YOU WILL BE GETTING CLOSE TO THE GROUND
SO BE SURE TO BRING STURDY CLOTHING....

DAY 3
EXPECTATIONS AND GOALS

1. During outdoor school I hope to do these activities: ____________________

    ____

    ____

2. During outdoor school I hope to learn about: ____________________

    ____

    ____

3. Positive actions and attitudes by each student contribute to a good experience at the outdoor school by all students. Select one new positive action or attitude that you plan to try during outdoor school.

    My personal goal (for an attitude or action) is ____________________

    ____

    ____

4. My parents would like me to ____________________

    ____

    ____

____
Parent's Signature

Return this assignment to your teacher.

Home Activity
Pre-Outdoor School

Modify as necessary

Name ______________________

TRANSPIRATION EXPERIMENT

Note to Parents: In preparation for outdoor school, your child has been studying many scientific concepts. This easy-to-do experiment will help your child learn more about the water needs of plants. Plan a time when you can do the setup and observations together with your child.

Transpiration is the process of water vapor moving from plants to the air. Tiny holes in the leaves allow water to evaporate into the air. To find out about transpiration, you will need:

a plastic baggie
piece of string or baggie tie
plant (either an outside or inside one will do)

Follow these steps:

1. Start early in the morning. This experiment works best on a sunny day. If you are using a house plant, set it by a window.
2. Place a baggie over a leaf and tie the baggie around the leaf stem.
3. After several hours, observe the baggie. What do you see? ____________

   ____
4. At the end of the day or the following day, remove the baggie and record your observations.

   ____

   ____
5. How do you explain what happened? ______________________

   ____

   ____

Home Activity
Post-Outdoor School

Modify as necessary

RESIDENT OUTDOOR SCHOOL
PARENT-STUDENT EVALUATION

Dear Parent:

Your child has just returned from resident outdoor school. Please find an appropriate time to complete this form with your child. Your comments will help us evaluate and improve this educational experience.

Questions 1 - 6 are to be completed by the parent and the student.

1. List your favorite activity. ____________________

   Identify one thing you learned during the activity. ____________________

   ____

2. What new ways did you learn to take care of our Earth? ____________________

   ____

3. Mark an X in the space that best describes how much you learned about each of the following topics.

	A Lot	Some	Not Much
Plants			
Animals.			
Ecology.			
Geology.			
Astronomy.			

4. How often did you have the opportunity to work together and cooperate with others at the outdoor school?

	Often	Sometimes	Never
How often did you have the opportunity to work together and cooperate with others at the outdoor school?			

   Describe one of your experiences. ____________________

   ____

5. Mark an X in the space that best describes each of the following.

	Excellent	Fair	Poor
The quality of food served			
The quantity of food served			

Questions 7-10 are to be completed by the parent

	Always	Usually	Never
6. How much of the time did you feel happy and successful at outdoor school?			

	Very Valuable	Somewhat Valuable	Not Valuable
7. After discussing the outdoor school program with your child, how valuable do you believe the experience was, in terms of:			
Increasing scientific knowledge			
Developing appreciation of the environment			
Promoting responsibility and cooperation			
Promoting a sense of self-worth			
The overall experience.			

	Inexpensive	Reasonable	Expensive
8. How would you assess the cost of your child's participation in the outdoor school?.			

9. What part of the outdoor school program did your child enjoy most? ________

____

10. Your suggestions and comments are welcomed. ____

____

THANK YOU!

________________________ Child's Name (optional)

________________________ Parent's Signature (optional)

RETURN TO YOUR CHILD'S TEACHER AS SOON AS POSSIBLE

Home Activity
Post-Outdoor School

Modify letter for your own use, including specific names of animals and places.

Dear Parents:

Your child has just experienced a unique learning opportunity at the outdoor school. This educational experience can be reinforced and extended by activities that you arrange for and/or do with your child. Here is a starter list of ideas for activities through which your child can "grow" in knowledge and understanding of the environment.

1. Visit a zoo. Be sure to observe animals that live in the area of the outdoor school site, but were not seen by the students.
2. Visit nature centers, museums, arboretums. Find out about programs offered for children.
3. Visit local historical sites.
4. Take the family for a day in the local mountains. Let your child tell you how this environment reminds him/her of the outdoor school area.
5. Take neighborhood walks together. Observe the seasonal changes.
6. "Adopt" a local tree. Give it a name. As you observe it carefully throughout the year, it will become a friend.
7. Grow a "pet" plant either indoors or outdoors.
8. Give gifts such as:
   - books on plants, animals, geology, astronomy, etc.
   - subscription to an education magazine, such as Ranger Rick.
   - computer software that helps your child learn more about the environment.
   - a whale-watching trip for the family.
   - a book about the care or history of a family pet.
   - an ant farm.
   - a birdfeeder for the yard.
9. Plant your backyard with shrubs which attract birds.
10. Plant a backyard vegetable and/or flower garden.
11. Encourage your child to join 4-H or other similar organizations, if possible.
12. Consider doing a project based on the local environment as a science fair project.
13. Participate in a recycling program for bottles, cans, and/or newspapers.

SECTION IV

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CALIFORNIA EDUCATION CODES RELATED TO OUTDOOR EDUCATION

Declares need for establishing educational programs to equip students with knowledge and attitudes necessary to develop solutions to environmental and resource problems.

EC 8700-8702, 8704, 8705, 8707

Declares need for long-term funding for effective programs, including outdoor study opportunity.

EC 8703

Environmental information should be taught in an interrelated manner at all grade levels.

EC 8706

The State Superintendent of Public Instruction, upon the recommendation of the Conservation Education Service, is authorized to make planning and implementation grants for programs and curriculum in conservation education.

EC 8730-8723

Governing board of any school district may conduct programs and classes in outdoor science and conservation education within or without the boundaries of the school district. Includes authority for personnel, supplies, property, contracts, and transportation.

EC 8760 (a,b,c,d)

Governing board of any school district may conduct courses in marine science.

EC 876I

Governing board of any school district may conduct courses in forestry.

EC 8762

The county superintendent may provide courses and classes in outdoor science and conservation education, and coordination services. Includes authority for personnel, supplies, property, contracts, and transportation.

EC 8763-8773

The adopted course of study shall provide instruction in the appropriate elementary and secondary grade levels and subject areas in the protection and conservation of resources and the necessity for the protection of our environment.

EC 51202

Allows the governing board to charge a fee for outdoor school programs, provided that payment of such fee is not mandatory. No student shall be denied the opportunity to participate because of nonpayment of fee.

EC 35335 in Article 13.5

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